

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

[The MINING JOURNAL is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.]

No. 2536.—VOL. LIV.

LONDON, SATURDAY, MARCH 29, 1884.

PRICE (WITH THE JOURNAL) SIXPENCE
BY POST £1 4s. PER ANNUM.

FIRST SILVER MEDAL, ROYAL CORNWALL POLYTECHNIC—Highest Award for Effectiveness in Boring, and Economy in the Consumption of Air
JUBILEE EXHIBITION, 1882.
THE PATENT

"CORNISH" ROCK DRILL.



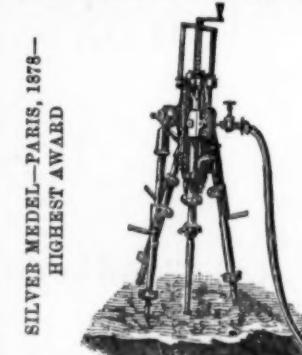
Prices and particulars on application to the Manufacturers

HOLMAN BROTHERS,
CAMBORNE FOUNDRY AND ENGINE WORKS,
CAMBORNE, CORNWALL.

ENGINES, AIR COMPRESSORS, TUNNELLING
CARRIAGES, TRIPODS, &c.,
From own design, or to order.

THE PATENT
"ECLIPSE" ROCK-DRILL
AND
"RELIANCE" AIR-COMPRESSOR."

First Silver Medal awarded at Boring Competition, East Pool Mine, Sept. 1883.



SILVER MEDAL—PARIS, 1878—
HIGHEST AWARD

Are NOW SUPPLIED to the
ENGLISH, FOREIGN, and
COLONIAL GOVERN-
MENTS, and are also IN USA
in a number of the largest
MINES, RAILWAYS, QUAR-
RIES, and HARBOUR
WORKS in GREAT BRITAIN
and ABROAD.

FOR ILLUSTRATED CATALOGUE AND PRICES apply to—
HATHORN & CO., 22, Charing Cross, London, S.W.

SOLID DRAWN BRASS AND COPPER
BOILER TUBES

FOR LOCOMOTIVE OR MARINE BOILERS,
EITHER

MUNTZ'S OR GREEN'S PROCESS.

MUNTZ'S METAL COMPANY (LIMITED),
FRENCH WALLS,
NEAR BIRMINGHAM.

LONDON AGENTS—CHARLES MOSS and Co., 2, Reed Lane, London, E.C.

J. S. MERRY,
ASSAYER AND ANALYTICAL CHEMIST,
SWANSEA,

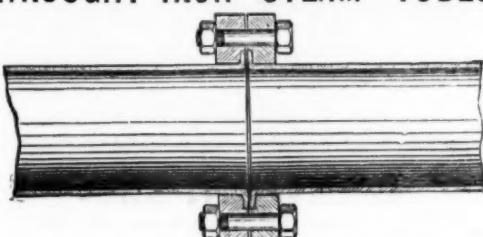
SUPPLIES ASSAY OFFICE REQUIREMENTS AND RE-AGENTS.

IMPROVED PATENT
INGERSOLL
ROCK DRILL
MEDALS AND HIGHEST AWARDS.

American Institute, 1872.
American Institute, 1873.
London International Exhibition, 1874.
Manchester Scientific Society, 1875.
Leeds Exhibition, 1875.
Royal Cornwall Polytechnic, 1875.
Paris Exhibition, 1878.

Rio de Janeiro Exhibition, 1875.
Australia Brisbane Exhibition, 1876.
Philadelphia Exhibition, 1876.
Royal Cornwall Polytechnic, 1877.
Mining Institute of Cornwall, 1877.
Paris Exhibition, 1878.

WROUGHT-IRON STEAM TUBES.



TUBES FOR BOILERS, PERKINS'S, and other HOT-WATER SYSTEMS.
For Catalogues of Rock Drills, Air Compressors, Steel or Iron Steam Tubing
Boiler Tubes, Perkins's Tubes, Pneumatic Tubes, and all kinds of Machinery and
MINING PLANT, apply to—

LE GROS, MAYNE, LEAVER, & CO.
60, Queen Victoria Street, London, E.C.

MACDERMOTT AND GLOVER'S PATENT
PERCUSSIVE ROCK PERFORATOR

(IMPROVED)
FOR HAND-LABOUR ONLY.

IN HARD ROCK
FOR MINES, QUARRIES, AND
GOVERNMENT CONTRACT WORK.

RATE OF PENETRATION
IN GRANITE,
1½ to 2 inches per minute.

Price £50 complete.

For full particulars, apply to
GLOVER & HOBSON,

ENGINEERS & MILLWRIGHTS,
ALBERT IRONWORKS, ST. JAMES'S ROAD, OLD KENT
ROAD, LONDON, S.E.

SOLE MANUFACTURERS; OR TO—

M. MACDERMOTT, 25 and 26, Pudding Lane, London.

N.B.—A machine can always be seen at work (without notice) at the Albert
Ironworks.

[TELEPHONE 4664.]

PERFORATED SHEET METALS

FOR
TIN, LEAD, AND COPPER MINES,

MILLERS, BREWERS, AND

MALSTERS,

COLLIERS AND

QUARRIES,

COFFEE ROASTERS

AND

SUGAR REFINERS.

ALDRED & CO.

OFFICE: 15, DICKINSON STREET,

WORKS: PARKER STREET, ASHLEY LANE,

MANCHESTER

AIR COMPRESSORS,

With R. SCHRAM'S

Patent Inlet and Outlet Valves.

BOILERS, TURBINES.

SCHRAM IMPROVED PATENT
ROCK DRILL.

1500 in Use in all Parts of the World.

Complete Rock Boring Plants of the most
approved construction for Railway Tunnels,
Quarries, Shaft Sinking, Level Driving,
Stoping, and Submarine Blasting.

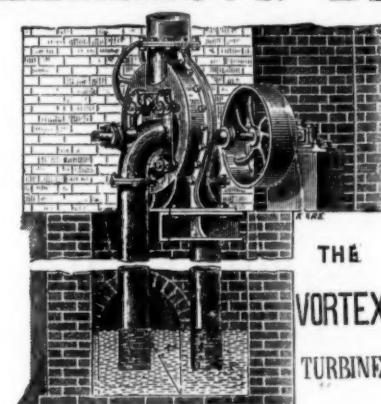
All Kinds of Mining Machinery.

ESTIMATES AND FULL PARTICULARS ON APPLICATION.

RICHARD SCHRAM & CO.,
9, NORTHUMBERLAND STREET, CHARING CROSS,
LONDON.

GILBERT GILKES & CO.,
KENDAL, ENGLAND,
LATE

WILLIAMSON BROS.



A most efficient means of applying Water Power to all kinds of
Machinery.

Largely used in DRIVING AIR COMPRESSORS, PUMPING,
WORKING ORE-CRUSHING MACHINERY, and for other purposes in connection with MINING.

Successfully used in ELECTRIC LIGHTING, and in utilising
DISTANT WATER POWER by means of ELECTRICITY.

A Pamphlet containing a full description of the Vortex, with several Illustrations and a number of Testimonials, can be obtained on application.

"THE PATENT ACCESSIBLE"
CENTRIFUGAL PUMP

Is the only Pump from which the disc can be removed by
breaking the joint on a single face only.

Manufactured by **CHARLES L. HETT,**
HYDRAULIC ENGINEER,
Maker of

IMPROVED CENTRE VENT,
TURBINES
WATER WHEELS,
Horse, Steam and Wind Power
PUMPS.

Catalogues on Application.
**ANCHOLME FOUNDRY, BRIGG,
ENGLAND.**

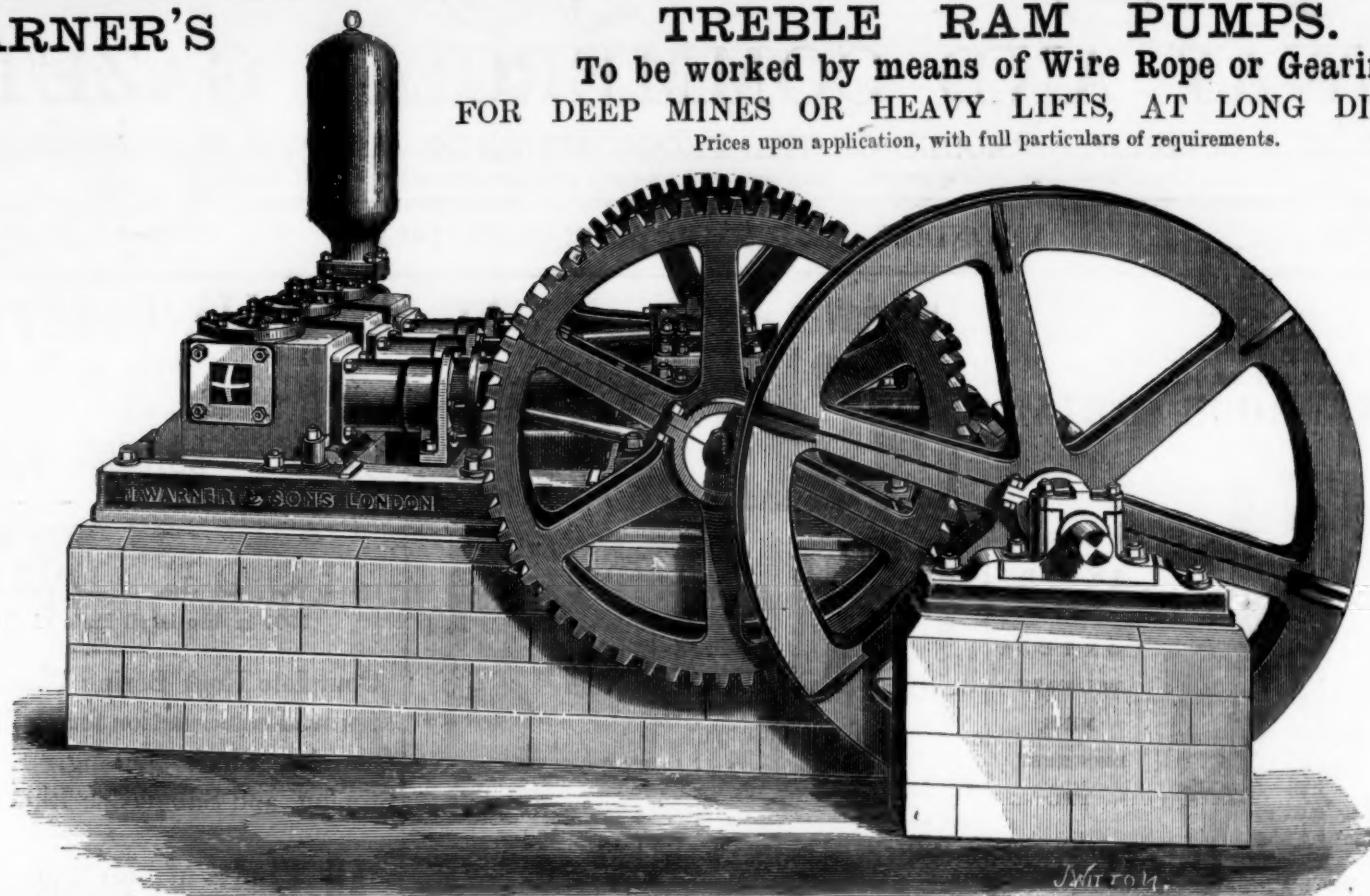
Pumping Engines
for
Mines, Water Works,
Sewage Works,
and
General Purposes.
CATLOGUES ON

PUMPING & MINING MACHINERY.

HATHORN, DAVEY, & CO., LEEDS.

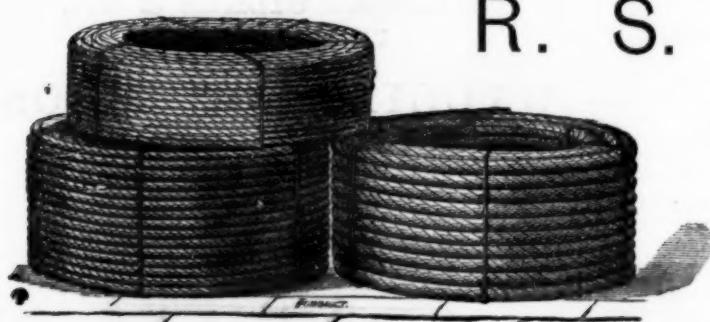
Hydraulic Pumps.
Winding Engines.
Air Compressors.
Man Engines,
Capstans,
&c., &c.
APPLICATION.

WARNER'S



As supplied to Messrs BOWES, of Springwell Colliery, Gateshead, for a Lift of (600) Six hundred feet vertical through two miles of pipes.

JOHN WARNER AND SONS, THE CRESCENT FOUNDRY, CRIPPLEGATE, LONDON, E.C.



R. S. NEWALL AND CO.,

Sole Patentees of Untwisted Wire Rope.

Iron & Steel Ropes of the highest quality for Collieries, Railways, Suspension Bridges, &c.

PATENT STEEL FLEXIBLE ROPES AND HAWSERS.

IRON STEEL, AND COPPER CORDS. LIGHTNING CONDUCTORS.

COPPER CABLES of high Conductivity for Electric Light and Power.

London: 130, STRAND, W.C. Liverpool: 7, NEW QUAY.

Glasgow: 68, ANDERSTON QUAY.

MANUFACTORY: GATESHEAD-ON-TYNE.

INCREASED VALUE OF WATER-POWER.

MacADAM'S VARIABLE TURBINE.

This Wheel (which is now largely in use in England, Scotland, and Ireland) is the only one yet invented which gives proportionate power from both large and small quantities of water. It can be made for using a large winter supply, and yet work with equal efficiency through all variations of quantity down to a fifth or even less if required. It is easily coupled to a steam-engine, and in this way always assists it by whatever amount of power the water is capable of giving, and therefore saves so much fuel.

This Turbine is applicable to all heights of fall. It works immersed in the tail-water, so that no part of the fall is lost, and the motion of the Wheel is not affected by floods or back-water.

These Turbines are at work in nearly every county in England. Apply to—

MacADAM BROTHERS AND CO., BELFAST.

SILVER MEDALS AWARDED AT CORNWALL POLYTECHNIC 1872 AND 1876.

THE WELL-KNOWN PATENT SELF ACTING ORE DRESSING MACHINERY, as in operation at most of the large Mines in the Kingdom and Abroad, is now supplied solely by THE PATENTEE AND MANUFACTURER, Mr. GEORGE GREEN Mining Engineer, AT GREATLY REDUCED PRICES also all descriptions of Mining Machinery, including

GOLD AND SILVER AMALGAMATING MACHINERY, complete Stamp Mills, Water Wheels, Steam Engines, &c.

ROLLER SHELLS FOR CRUSHING MILLS—a specialty

SPECIAL DESIGNS FOR EXPORT AND DIFFICULT TRANSPORTS

Prices and particulars on application to the Manufactory ABERYSTWITH, SOUTH WALES

Just ready, price 3s., cloth, New Edition (7th).

HOPTON'S CONVERSATIONS ON MINES. Much improved revised, and enlarged. With 200 questions to assist applicants to obtain Managers' Certificates.

Manchester: ABEL HEYWOOD and SON, 56 and 58, Oldham-street, London: SIMPKIN, MARSHALL, and Co., Stationers' Hall-court MINING JOURNAL Office, 26, Fleet-street;

And all Booksellers,

DEUTSCHE SPRENGSTOFF ACT.-GES.

(GERMAN EXPLOSIVES COMPANY, LIMITED),

HAMBURG.

DYNAMITE

Of the HIGHEST DESCRIPTION, and of the maximum strength allowed by the British Explosives Act (75 per cent. Nitroglycerine).

CHAIRMAN - - - Dr C. E. BANDMANN, } Late Partners of Messrs. A. Nobel and Co., of Hamburg.
GENERAL MANAGERS Mr. C. F. CARSTENS, }

Mr. C. WICHMANN, Late Partner of Messrs. Bessler Waechter, and Co., London.

HEAD OFFICE: HAMBURG, PLAN, 9.

LONDON AGENT: MR. WM. BRODERSEN, 79, LEADENHALL STREET, E.C.

SHIPMENTS EFFECTED TO ALL PARTS. STOCK KEPT IN LONDON AND NUMEROUS COUNTRY MAGAZINES

SILVER MEDAL (HIGHEST AWARD) MELBOURNE, 1881.

JOHN SPENCER,

Globe Tube Works, WEDNESBURY,
AND 3, QUEEN STREET PLACE, CANNON STREET, LONDON, E.C.

FIRST PRIZE, SYDNEY, 1880.

TUBES AND FITTINGS for Gas, Steam, and Water; Galvanised, Enamelled, and Hydraulic Tubes; Boiler Tubes and Fittings; Gas Fitters' Tools; Brass Cocks, &c.

ANTI-CORRODO TUBES AND FITTINGS COATED BY BARRY'S INLESSPROCESSES

TUBES

R. HUDSON'S Patent Steel Trucks, Points and Crossings, PORTABLE RAILWAY, STEEL BUCKETS, &c., &c.

Telephone No. 14.
In connection with the
Leeds Exchange, and all
the principal Hotels and
places of business in the
town.

GILDERSOME FOUNDRY, NEAR LEEDS.

(Near Gildersome Station, G.N.R. Main Line, Bradford to Wakefield and London,
via Laisterdyke and Ardsley Junctions.)

Registered
Telegraphic Address:-
"GILDERSOME
LEEDS."
A. B. C. Code used.

UPWARDS of 25,000 of these Trucks and Wagons have been supplied to the South African Diamond Mines; American, Spanish, Indian, and Welsh Gold, Silver, Copper, and Lead Mines; Indian and Brazilian Railways, and to Railway Contractors, Chemical Works, Brick Works, and Coal and Mineral Shippers, &c., &c., and can be made to lift off the underwork, to let down into the hold of a vessel, and easily replaced. They are also largely used in the Coal and other Mines in this country, and are the LIGHTEST, STRONGEST, and most CAPACIOUS made, infinitely stronger and lighter than wooden ones, and are all fitted with R. H.'s Patent "Rim" round top of wagons, requiring no rivets, and giving immense strength and rigidity. End and body plates are also joined on R. H.'s patent method, dispensing with angle-irons or corner plates.

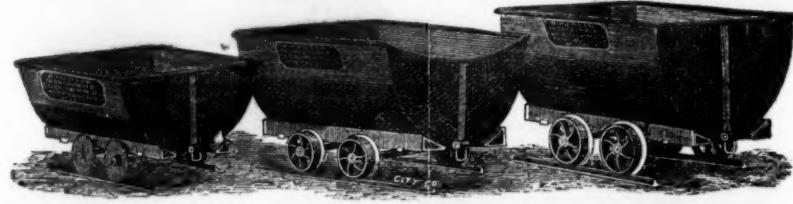
Patented in Europe, America, Australia, India, and British South Africa, 1875, 1877, 1878, 1881, and 1883.
N.B.—The American, Australian, Indian, and Spanish Patents on Sale.

CAN BE MADE TO ANY SIZE, AND TO ANY GAUGE OF RAILS.

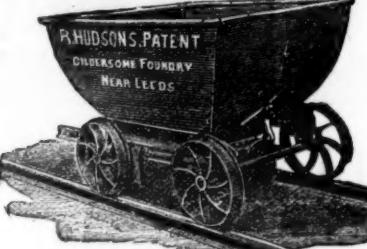
1.—PATENT STEEL END TIP WAGONS.



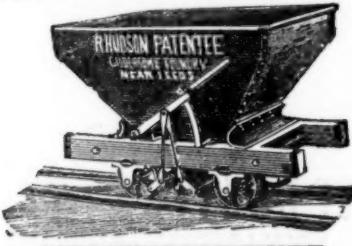
7.—PATENT STEEL MINING WAGONS.



12.—PATENT STEEL HOPPER WAGON,
WITH BOTTOM DOORS.



13.—PATENT STEEL HOPPER WAGON.



14.—SELF-RIGHTING STEEL
TIP BUCKET.
(The "CATCH" can also be made SELF-
ACTING if desired.)

15.—STEEL CAGE.



17.—STEEL SELF-CONTAINED
TURNTABLE.

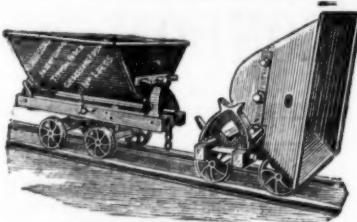


(Also made in CAST Iron for use where
weight is not a consideration.)

NO. 19.—PATENT STEEL CHARGING BARROW,
DOUBLE the STRENGTH & much LIGHTER than ordinary Barrows



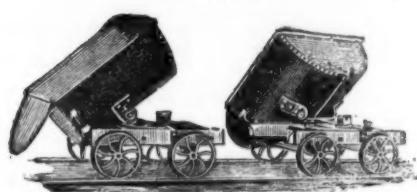
2.—PATENT UNIVERSAL TRIPLE-CENTRE
STEEL TIPPING TRUCK,
Will tip either side or either END of rails.



8.—PATENT DOUBLE-CENTRE STEEL
SIDE TIP WAGONS,
Will tip either side of Wagons.



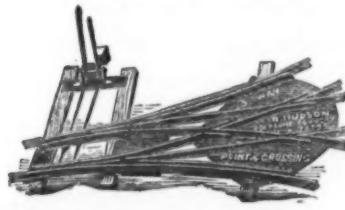
9.—PATENT STEEL ALL-ROUND TIP
WAGON.



10.—LEFT-HAND STEEL POINT AND
CROSSING.



11.—RIGHT AND LEFT-HAND STEEL
POINT AND CROSSING.



16.—PATENT STEEL WHEELBARROWS.

Made to any Size.
Lightest and Strongest in the Market.



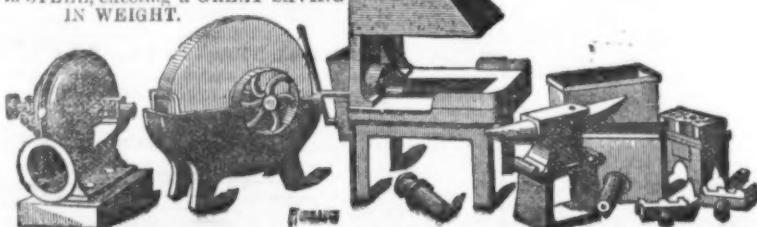
A great success.

18.—"AERIAL" STEEL
WINDING TUB.



Largely employed in the South African
Diamond Fields.

6.—ROBERT HUDSON'S
PATENT IMPROVED IRON
SMITH'S HEARTH.
NO BRICKWORK REQUIRED.
A Special quality made almost entirely
in STEEL, effecting a GREAT SAVING
IN WEIGHT.



Large numbers in use by all the principal Engineers in this
country and abroad.

ALL KINDS OF BOLTS NUTS, AND RIVETS MADE TO ORDER ON THE PREMISES

BELL'S ASBESTOS.

BELL'S PATENT ASBESTOS BLOCK PACKING, for High Pressure Engines. This Packing has been specially designed to overcome the difficulties experienced by engineers and others in the practical working of engines of the most modern type of construction. The greatly increased skill and workmanship now obtained in the construction of engines and boilers have led to a rapid increase in the working pressure, the object being the attainment of a high rate of speed combined with economical working, the practical advantage of which, however, cannot be realised unless the Packings are so constructed as to avoid stoppages for the purpose of re-packing the stuffing boxes. It is now a recognised fact that the most perfect heat-resisting material suitable for the purpose of a Packing is Asbestos, but to ensure a successful application of this fibre, great skill is required in manufacture. In this Packing the Asbestos is woven into a stout cloth, and owing to the peculiar way in which it is manipulated, great elasticity is imparted to the Packing. This Packing has met with the most unqualified approval wherever it has been used, and on being taken out after about twelve months' working at 70 lb. pressure, it has been found to be in a perfect state of preservation, and will therefore replace. The Patent Block Packing is square, as Fig. 1 and Figs. 2 and 3 represent the Round Block Packing with solid and hollow rubber core, and Fig. 4 without core, but with rubber inlaid. An Engineer writes as follows:—“The Asbestos Block Packing works splendidly. I have never seen its equal. We keep our glands tight so that you can move them with finger and thumb, and can maintain a constant vacuum of 28½ in.” As these packings are extensively imitated, and as it is a common practice among dealers and agents to supply the cheaper manufacturers at my list prices, users are requested to see that the packing supplied to them bears my trade mark.

BELL'S ASBESTOS BOILER PRESERVATIVE. This useful mixture by absorbing the free oxygen that is in the water entirely checks pitting and corrosion. It also disintegrates incrustation so immediately as to prevent its adhering to the plates. Not only is a great economy of fuel effected by keeping boilers clean, but the risk of having the plates burned is thereby obviated. It has been computed that 1/16 in. thick of incrustation causes a waste of 15 per cent. of coal; 1/8 in., 60 per cent.; 1/4 in., 150 per cent. Thus the Preservative avoids the great risks which are inseparable from scaled plates, lengthens the life of a boiler and covers its own cost a hundred-fold by economy of fuel. It is entirely harmless, and has no injurious action on metals. It can be put into the feed tank or boiler, as may be most convenient. Sold in drums and casks bearing the Trade Mark, without which none is genuine.

BELL'S ASBESTOS YARN and SOAPSTONE PACKING

for Locomotives, and all Stationary Engines running at very high speed with intense friction.

The following Testimonial refers to this Packing:—

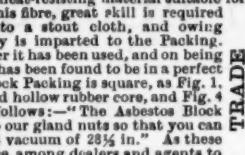
Festiniog Railway, Locomotive Superintendent's Office, Portmadoc, January 12, 1883.

Mr. John Bell, 118, Southwark-street, S.E.

DEAR SIR,

I have much pleasure in saying that the Asbestos Yarn and Soapstone Packing gives every satisfaction; indeed, better than we expected. We have a locomotive packed with it, which has been running five months (and think of the piston speed with our small wheels). I think the Soapstone a great improvement, as it keeps the packing elastic, and prevents it getting hard. I am very pleased with its working, and also the very low price for such good lasting Packing. The Asbestos Yarn we find is very useful, and lasts admirably.

Yours truly,
(Signed) W. WILLIAMS.



BELL'S ASBESTOS BOILER AND PIPE COVERING COMPOSITION, for coating every class of steam pipes and boilers, non-combustible and easily applied when steam is up; adheres to metals and preserves them from rust; prevents the unequal expansion and contraction of boilers exposed to weather; covers 50 per cent. more surface than any other coating, and is absolutely indestructible. It can be stripped off after many years' use, mixed up with 20 per cent. of fresh, and applied again. The composition is supplied dry, and is only to be mixed with water to the consistency required for use.

A Horizontal Boiler, 17 ft. 6 in. long, 15-H.P., gave the following results:—

Temperature on Plates - - - 186 deg.

" " Covering - - - 94 deg.

One ton of coal was saved per week, and although the fire was raked out every evening, 20 lbs. of steam were found in the boiler next morning.

The following Testimonial refers to this Covering:—

Office of the Wimbledon Local Board, Wimbledon, Nov. 23rd, 1883.

W. SANTO CRIMP, C.E., F.G.S.

DEAR SIR.—It may interest you to know that we save exactly 40 per cent. in fuel through your covering.—Yours truly,

BELL'S ASBESTOS and INDIA-RUBBER WOVEN TAPE and SHEETING, for making every class of Steam and Water Joints. It can be bent by hand to the form required without puckering, and is especially useful in making joints of manhole and mudhole doors; also for large “still” joints where boiling fat and steam have to be resisted. It is kept in stock in rolls of 100 ft., from 3/8 in. to 3 in. wide, and any thickness from 1/16 in. upwards. Manhole covers can be lifted many times before the renewal of the jointing material is necessary. The same material is made up into sheets about 40 in. square, and each sheet bears the Trade Mark, without which none is genuine. It is very necessary to guard against imitations of this useful material, and to secure themselves against being supplied with these inferior articles at my price, users are recommended to see that every 10 ft. length of the Asbestos Tape purchased by them bears the Trade Mark.

BELL'S SPECIAL LONDON-MADE ASBESTOS MILLBOARD, for Dry Steam Joints, made of the best Asbestos fibre, is well-known for its toughness and purity, and is absolutely free from the injurious ingredients frequently used to attain an appearance of finish, regardless of the real utility of the material. Made in sheets measuring about 40 in. square, from 1/64 in. to 1 in., and 1/4 millimetre to 25 millimetres thick. Each sheet bears the Trade Mark.

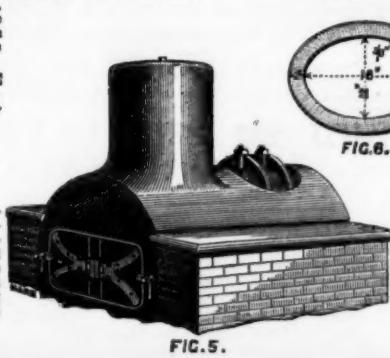
BELL'S ASBESTOS EXPANSION SHEETING (PATENT).

This Sheeting is another combination of Asbestos with India-rubber, giving to the steam user the special advantages of both materials.

The India-rubber Washer is protected from the action of heat and grease by an outer coating of vulcanised Asbestos Cloth, thus producing an excellent joint where expansion and contraction render other materials unserviceable.

This material is admirably suited to steam pipe joints and every class of valve.

Valves made of this material are very durable, as they are not subject to injury by oil.



BELL'S "ASBESTOS LUBRICANT."

ILLUSTRATED PRICED CATALOGUE FREE ON APPLICATION TO

BELL'S ASBESTOS WORKS, SOUTHWARK, LONDON, S. E.

Victoria Buildings, Deansgate, MANCHESTER.

11 and 13, St. Vincent Place, GLASGOW.

39, Mount Stuart Square, CARDIFF.

21, Ritter Strasse, BERLIN.

TELEPHONE NUMBER—

1336.

Explosives Trading Company, Limited.



TELEGRAPHIC ADDRESS—
NEDGORB, LONDON.

Now ready, price 25s., post free.

COMPOUND DIVISION COST SHEET READY RECKONER.
Designed for effecting in minutes what has hitherto taken hours to accomplish.

For use in making out Cost Sheets of Collieries, Ironstone and other Mines, Iron, Gas, and Water Works, Quarries, and Manufactories generally. For Accountants, Merchants, Public, and Private Offices.

By WILLIAM WETHERED.

This work is applicable to calculations where any number of articles cost is given sum, and the price of one of such number is required.

The circulation of such a book as this must necessarily be limited. It is doubtful whether it will pay more than the bare cost of publishing, allowing nothing for the enormous amount of labour such a mass of figures has occasioned. The price cannot be named at less than 25s., and it is not too much to say that where it can be applied its cost will be saved in a few weeks. It will be found invaluable to accountants generally.

Copies can now be had, and will be forwarded from the MINING JOURNAL Office on receipt of Post Office Order for the amount.

Just published, price 7s. 6d., post free.

TABLES FOR ASCERTAINING THE PRICE OF TIN ORE AT A GIVEN STANDARD AND PRODUCE:

To which is added Tables for Ascertaining the Value of any Quantity of Black Tin, from 1 lb. to 10 tons, at any price from £20 to £100 per ton. Originally compiled and calculated by the late Mr. R. WELLINGTON; and now extended, reprinted by Mr. W. BAILEY, of Camborne, and carefully verified throughout.

London: MINING JOURNAL Office, 26, Fleet-street, E.C.; and may be had by order of all Booksellers.

Australia: GEORGE ROBERTSON, Melbourne, Sydney, Adelaide, and Brisbane.

Just published.

THE NORTH WALES COAL FIELD
Being a series of Diagrams showing the Depth, Thickness, and Local Name, of the Seams in the principal Collieries of the various districts, with Index, Geological Map, and horizontal sections across the Ruabon, Brymbo, Buckley, and Mostyn districts.

By JOHN BATES GREGORY and JESSE PRICE, of Hope Station, near Mold, Flintshire.

Price: Mounted on Holland, coloured and varnished, and fixed on mahogany rollers, 30s. each; or in book form, 12x9, mounted and coloured, 25s. each.

May be obtained, by order, of all Booksellers, or direct from the MINING JOURNAL Office, 26, Fleet-street, London, E.C., upon remittance of Post Office Order for the amount.

Just published.

THE COLLIERY READY-RECKONER AND WAGES CALCULATOR.

By JAMES IRELAND.

“Will be the means of preventing many disputes between pay clerks and colliers.”—MINING JOURNAL.

To be had on application at the MINING JOURNAL Office, 26, Fleet-street, E.C.

PHILLIPS' MONTHLY MACHINERY REGISTER.—THE BEST MEDIUM IN THE KINGDOM

FOR THE PURCHASE OR SALE

OF NEW OR ECONOMICAL MACHINERY

Subscription, 4s. per annum, post free.

PUBLISHER AND PROPRIETOR, CHARLES D. PHILLIPS, NEWPORT MON.

ESTABLISHED FIFTY YEARS.

THE MINING JOURNAL, RAILWAY AND COMMERCIAL GAZETTE
Has the Widest Circulation

Amongst MINERS, METALLURGISTS, ENGINEERS, And all

FINANCIAL AND COMMERCIAL MEN

THROUGHOUT THE GLOBE.

PRICE SIXPENCE WEEKLY.

SUBSCRIPTION:

Great Britain £1 4 0 per annum.

Postal Union 1 8 0 "

LONDON:

MINING JOURNAL OFFICE, 26, FLEET STREET AND TO BE HAD OF ALL BOOKSELLERS AND NEWSAGENTS.

ISLETTEN PRÈS FLUELEN,
SWITZERLAND.

CESANO MODERNO PRÈS MILAN,
ITALY.



AVIGLIANA PRÈS TURIN,

ITALY.

ONEGLIA (PROVINCE LIGURE),
ITALY.

WHICH SUPPLY THE

GOVERNMENTS OF ITALY AND SWITZERLAND.

And obtained among other Medals (English and Foreign),

THE GOLD MEDAL, PARIS EXHIBITION, 1878.

Inferior Dynamite is a cause of so much danger, both in transport and use, that The Explosives Trading Company, Limited, make QUALITY their first consideration. The price may, therefore, appear high, but, strength and safety being considered, IT IS LOWER THAN THAT OF ANY OTHER EXPLOSIVE.

The Explosives Trading Company, Limited, refer to the following Extracts from Official Certificates and from Contractors, who have purchased and used no less a quantity than

TWO THOUSAND TONS,

Representing at 1/6 per Pound,

£300,000 STERLING.

All Dynamite sold is specially tested for SAFETY, QUALITY, and CAPABILITY OF SUPPORTING SEA VOYAGES, so that Goods bearing this Company's Trade Mark, COMMAND A PREFERENCE in every market.

1. “Always of superior quality.” P. Pn. L. FAVRE & Cie., BOSSI, Director.”

2. “Exclusively employed, irreproachable quality.” REVELLAC, BARDOL & Cie.”

3. “For constructing the line between Fluelen and Gosschenen we used TWO HUNDRED AND FIFTY TONS, the whole of which was supplied by the Dynamite Nobel, Isleten. There was NEVER ONE SINGLE ACCIDENT IN THE TRANSPORT. Gives to these works the best certificate.”

Aldorf, 11th October, 1881. Baugesellschaft Fluelen, Gosschenen.

(Sig.) ROB. MOSER.”

4. “Quality of the Explosives gives us full and complete satisfaction.” For the Società Marsaglia, Enterprise de la ligne du St. Gotthard, Alpin-Banca.

(Sig.) A. BONZANIGO, Engineer.”

5. “All the Dynamite and Gelatine used came exclusively from the Isleten Works. Quality completely satisfies me.” (Sig.) ING. DELLAQUA.” Milan, 14th June, 1883.

The Explosives Trading Co. supply (to purchasers of their Dynamite only) DETONATORS AND FUSE, of specially high quality, both Detonators and Fuse being protected by the Company's Trade Mark. Contracts made for regular supplies of Dynamite Detonators and Fuse, delivered by the Company's own boats.

STOCK ALWAYS ON HAND IN THE THAMES READY FOR SHIPMENT.

Sole Agents (with such special advantages as to ensure a large and permanent business) appointed in English Colonies and Foreign Countries.

Sole General Agents for the Company—G. W. H. BROGDEN & CO., 220, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.

Original Correspondence.

GUINEA COAST GOLD MINING COMPANY.

SIR.—I am glad to note from "P.'s" letter in last week's *Mining Journal* that he is, like myself, a *bona fide* shareholder in this company, having paid 17 per share for his holding, and I hasten to inform him that I have never been a member of the syndicate he refers to, nor have I in any way derived profit or the slightest benefit from my holding. I have certainly from time to time purchased more shares at the present ridiculously low prices in order to make a good average. I have a friend recently returned from the Gold Coast, who informs me that in almost any part of the Appollonia district, with careful economical management, gold can be found in paying quantities, and I am certainly prepared to wait a few months for results of the present working at Insamankao. At the recent meeting the Chairman asked the shareholders to wait a few months to know the actual backbone of the property, and I may inform "P." that if the results are not satisfactory, say within six months from date, I shall be prepared to join him in any steps that may be considered desirable for the protection of our respective interests.

Manchester, March 24.

GUINEA COAST GOLD MINING COMPANY.

SIR.—Having visited both Izrah and Insamankao, permit me to assure your correspondent "P." that those two properties are not 70 miles apart, as stated in his letter in last week's *Mining Journal*; the actual distance, as the crow flies, between the two places, is under 23 miles.

If "P." will have patience, and take into consideration all the difficulties and delays incidental to the development of a mine on the Gold Coast, he will, in the long run, not have reason to regret his investment. Directors need assistance and encouragement, not constant carpings and cavilling at all they do.

W. T.

Earl's Court, March 24.

HEALTH ON THE GOLD COAST.

SIR.—A few remarks respecting the climate of the Gold Coast of Africa might not be without interest to some of your readers, inasmuch as the recent gold mining enterprises in that neighbourhood appear to suffer from a lack of public attention, begotten no doubt of the deadly character usually ascribed to the climate, acting as a bugbear and deterrent to capital; I think it only fair to record the results of my experience bearing on the subject. I will freely admit at the outset, when I left England over three years ago, I shared in the popular belief as to the insularity of the West Coast of Africa as a residence for Europeans. After a professional practice, however, of three years' duration in connection with the majority of the gold mines in Eastern Wassau, I have reason to think the disastrous influence of the climate on the health of Europeans has been much overstated. Indeed, a close personal observation of the diseases of that country, as met with in the Tacquah district, during the above-mentioned period, has, on the contrary, convinced me that its climate can compare favourably with that of some parts of India, Central America, Brazil, and a considerable number of the West Indian Islands.

The types of fever usually met with do not belong to the generally serious or fatal classes of malarial fevers, or what under any circumstances can be called malignant or pernicious. Yellow fever is apparently unknown. Decidedly the most frequent form of complaint out there is the so-called "bilious attack," dependent upon a state of engorgement of the liver, which may be brought about by a variety of causes. Notably among these are chills, exposure to the sun, malaria, and too stimulating diet. Associated with such attacks frequently intermittent, and occasionally remittent, fevers are met with, accompanied by their various complications. It is in this direction lies the source of greatest danger. Isolated cases of dysentery occur from time to time among the white population, but these under prompt treatment have usually yielded to the ordinary measures. Liver abscess is seldom, if ever, heard of. The following *résumé* of facts from my medical diary bearing on the health of the mining communities in the Tacquah district of East Wassau will speak for itself:—

1.—EFFUENTA GOLD MINING COMPANY.—During my connection for 14 months with these mines no deaths occurred from illness either among the European or native employees; one death within three hours of a very severe accident to a Krooboy being the sole instance of mortality during that period. One European was invalidated shortly before my arrival at the mines by my predecessor, whose certificate I subsequently confirmed.

2.—THE GOLD COAST MINING COMPANY.—For the past three years only two deaths have been recorded—one of a European member of the staff, who died at some distance from the mines, and who some years previously had sustained a severe injury to his skull, which left permanent visible alterations; the other of a native, who was killed outright by an accident. No European has been invalidated from these mines during this space of time.

3.—MESSRS. SWANZY'S MINES—NOW THE WASSAU (GOLD COAST) MINING COMPANY.—At these mines during my official connection of close upon two years two deaths were reported—one of a European of advanced years, who sank from bilious remittent fever; the other, a native, who succumbed to the effects of a gunpowder explosion.

4.—THE TACQUAH GOLD MINES.—While I was attached to these mines, for over nine months, no European died. Two native labourers were lost through pneumonia. One European, well advanced in age, was invalidated.

5.—THE FRENCH MINING COMPANIES—LA COMPAGNIE DE LA CÔTE D'OR D'AFRIQUE, ET LA COMPAGNIE DE LA MINE D'OR D'ABOSO.—These companies have employed my services occasionally, and at one time continuously for a twelvemonth. During the latter period three Europeans died—one from delirium tremens, another very suddenly while bathing in the sea 80 miles from the mines, and the third was murdered in his bed. No mortality among the blacks during said period. Two Europeans were invalidated. During other casual attendances two other Europeans died—one, who was moribund when I first saw him, died from effusion on the brain; the other from syncope during convalescence from a bilious remittent attack.

Besides the fatalities enumerated above 10 other deaths have occurred in connection with the French and other mining companies while under the care of other medical men. About a dozen Europeans have also been invalidated from time to time. In most of the instances above referred to death could not be ascribed solely to climatic causes, and in some it was altogether independent of such origin. Tenus, delirium tremens, pneumonia, and apoplexy, &c., can scarcely be regarded as purely tropical diseases. Among those in which the influence of climate could be traced the type of the illness in the first instance did not belong to the usually severe or fatal classes. Complications arising from peculiar constitutional states, and in not a few cases from acts of indiscretion were the cause of the untoward result. The element of "funk," no mean factor in determining a fatal issue, was very pronounced in most of the cases brought under my notice, and the more reckless and irregular the habits of the individual the more striking was this mental condition in sickness. In respect of the individuals who have been invalidated the greater number were from the first ill-fitted constitutionally and badly equipped for a rough life in the tropics. In fact they were such as no insurance office would accept as first-class lives. Others must lay the blame unfortunately to their own follies rather than to the climate.

Situated as the district of Tacquah is in the midst of dense forests, about 800 to 900 ft. above the level of the sea, from which it is distant from 40 to 50 miles, the range of temperature is less than on the coast line. The highest thermometric reading I have observed being 93° Fahr. in the shade, and the lowest 65°, between 5 and 6 o'clock a.m., during the harmattan months. The rainfall throughout the year is very considerable, and the effects of a warm atmosphere highly charged with moisture are to be constantly guarded against. However, when the land is extensively cleared and drained, and

what is more to the purpose placed under cultivation, these dangers will to a great extent disappear, and I am of opinion that the climate will be such as no European of sound constitution and habits of life regulated by a due amount of self-respect need ever fear to live in. I feel assured besides if more care were exercised in the selection of persons better suited physically to adapt themselves to the varying exigencies of bush-life—and there are many instances of a neglect of such care at present—we should hear less of "victims to the climate," and the mining companies could not fail to be benefited by an improved physique on the part of their officials, and by the encouragement which this would afford to the introduction into the country of intelligence and practical ability of the proper sort.

WM. BOURKE, M.B., M.C. Edin., M.R.C.S. Eng.

City Club, March 24.

A DISCOURSIVE VIEW IN THE INTEREST OF MINING—
No. IX.

SIR.—The anomalies of modern mining constitute a theme which passes ordinary comprehension, whether considered in respect of its objective or subjective relations—divisions which comprehend and include its industrial, commercial, and wealth-producing aspects, the latter comprising its primary and final objects—pecuniary results, and their originating channels. From this succinct view a variety of considerations present themselves. The subjective relations of this great industry—paramount and indispensable to the progress and advancement of every other art and industry—is wholly arbitrary, and, consequently, not easily defined. The extreme limit of its subjective side is subjugation, and that has been accomplished and improved; to purposes inimical to its best interests—that is to say, to its proper development and fullest success. If it had not gone astray—or rather had not been forced into unnatural and highly reprehensible relationships and channels—it would have long since been regarded not only as the leading original wealth-producing industry, but the most popular and profitable field of enterprise for the employment and augmentation of capital. As a wealth-producing industry it is not only unrivalled but unequalled, whilst the profits derivable from its proper prosecution are commensurable with the abounding fertility of its almost limitless sources. No country ever has or ever can become great in the recognised and accepted sense of that term that has not its developed mines yielding the precious or other metals and minerals of commerce; but all this is as well known generally as I can state it. But what I am desirous of showing is that mining *per se*—that is divested of all extraneous encumbrances and appendages would be as simple as simplicity itself; but it has been forced to become the playground of arrant and unscrupulous speculators, whereby nothing in many respects is regarded but its name, and that prostituted to ulterior purposes, with callous indifference to the merit or otherwise of the legitimately primal objects—the ostensible sources of the wealth objectively which should be the all-absorbing, inspiring, and governing incentives. It is due in a large measure to the subjective abusement of mining that its practical conduct—misconduct—has been in so many instances prolific only of deplorable results. If an original wealth-producing enterprise is to be made the substitute of artifice for another or other enterprises non-producing and inferior in purpose, but popular because more immediately speculative and exciting from the nearness of its view, and the conformability of its *regime* to the fancies, vagaries, and caprices of arrogantly arbitrary intellects, pliable tools, rather than stern practically experienced superintendents will be the chosen and authoritatively invested executive officials, for the purpose, it is presumed, the more effectually to consummate the nefarious designs, and render symmetrical the abnormal fabric from bottom to top. But this is not all. All men, even appreciably good men, are not compounded of elementary constituents capable of resisting mercilessly adverse strains, but are susceptible of and influenced by motives of policy, dictated by the nature and circumstance of their surrounding "To be, or not to be," is to dependent ambitious men, in view of livelihood and position, a serious question to be what they would not, or not to be what they would, is a hideous and embarrassing alternative, involving a sacrifice of principle, or, what is next to it social, and it may be pecuniary, advancement, and hence it is that the faculty to "please well" is an accomplishment more highly appreciated and more liberally remunerated than the most unquestionable qualifications commended by the most assiduous endeavours to "serve well"; and, hence, also, it is that tactics for progresses other than those of mining on the merits become an embodiment in sundry schemes, garnished with the fripperies of imagery, fancifully conceived, to the manifest injury of mining—its unpopularity as an enterprise and degradation as a pursuit. That this view is pessimistic is due to the subjective faculty of reason as exercised with the stubborn reality of facts. The objectionable features are arbitrary innovations, and not a natural outgrowth of the system's development; are not even a temporary necessity of its being or well being engrafted excrescences, exterior in objects, and demoralising in their effects.—*One, Nye County, Nevada, March 2.* ROBT. KNAFP.

WYNAAD PERSEVERANCE COMPANY.

SIR.—I have been waiting to see whether the directors of the Wynnaad Perseverance Company would have the courage to send to the shareholders a verbatim report of the proceedings of the extraordinary general meeting held on March 14. Ten days have now elapsed, and still the shareholders who were absent are kept in utter ignorance of what took place. I, therefore, with your permission, would ask them to read the (necessarily) condensed report in the *Mining Journal* of March 15, by which they will see that the shareholders decided to allow the directors to speculate with the remaining funds of the company, which are nominally equal to (say) 2½ per cent. of the original capital, or 4 per cent. of subscribed capital, in the vain hope of ultimately getting a dividend—a forcible illustration of drowning men catching at straws, or even at "rhea grass!" The course adopted at the meeting is diametrically opposed to the recommendation of the Committee of Investigation, of which I was a member; but a few months probably will decide who was right, and I am quite content to wait events.

Shareholders, as usual, appear to have entrusted their proxies to the directors with blind confidence; but if they had but taken the trouble to have investigated the past history of the company, by simply referring to the directors' reports of 1881, 1882, and 1883, they would have been able to judge of the value of the board's predictions and promises (apart from the question of the yield of gold), and would have more thoroughly appreciated the committee's report.

Extracts from report of Oct. 26, 1881:—"They think this is a good opportunity for informing the shareholders of the exact state of affairs with regard to the position of the company, which, in their opinion, is favourable, and they themselves have every confidence in its success. Available cash in hand invested—24,500£, out of the 30,000£ remaining over after paying the vendors the purchase-money (50,000£) in cash and shares. Coffee—150 acres now planted; this year's crop, owing to deficiency of rain, will not be good; trees are capable, in a good season, of producing about a 40 ton crop, which would leave a good margin for profit. Cinchonas: To date 89,000 succirubra and 950 cal. ledgeriana have been planted out permanently, and next season another 20,000 or 30,000 succirubras will be planted from the nurseries. These trees will, in the course of four or five years, produce a large income—say, at the rate of 1 lb. of bark per tree, at 2s. per lb., on about 100,000 trees, 10,000£. per annum." Extracts, report of Nov. 30, 1882:—"Coffee: The recurrence of three bad seasons for the cultivation of coffee caused serious anxiety to the directors. The losses from coffee (163L 19s. 2d.), as shown in the present balance-sheet, have practically added considerably to the cost of the cinchona plantation, which, the directors anticipate, will prove a very valuable property." "Cinchona: There are now 91,000 trees planted out on the estate."

In July, 1883, the directors laid before the shareholders reports from Mr. G. O'Brien and Mr. Thomas Stanes on the mining and cultivation respectively, and, at the same time submitted a proposition to the shareholders for acquiring the Mammoth estate; but this was ultimately rejected, on the recommendation of the committee to which it was referred.

Mr. O'Brien's report was most discouraging, and gold mining was abandoned.

Mr. Stanes reported on the coffee and cinchona as under:—

"Coffee: No. 1 field, on the north-west side, has, to all intents and purposes, been abandoned. The cinchonas planted in this field between the old coffee trees are doing fairly well. No. 2 field, on opposite side of the ridge, is decidedly better in appearance; but the whole field, with the exception of about 40 acres, had the appearance of neglect and want of cultivation. About 40 or 50 acres of the coffee in this field is looking decidedly well, and has a fair show of crop on it—I should estimate about 6 tons; but it sadly needs handling and weeding. Cinchona: There are about 60,000 succirubra, growing well and looking healthy. The cinchona ledgeriana are looking remarkably well. . . . There are about 950 of these plants, according to the account given me by the manager."

The directors mention that though the cinchona plantation is reduced to 60,000 trees, will, with moderate and inexpensive yearly additions, be yearly increased in value, and may be expected to yield in 1886 a gross return of 90,000 lbs. weight—say, at a medium price of 1s. 6d. per lb., 6750L. In the report (Dec. 15, 1883) there is not a word about coffee or cinchona, but the accounts show a loss on cultivation of coffee to May, 1883, of 1798L 11s. 4d., and the directors say that "barely one-tenth of the 30,000£ working capital now remains." From the above extracts unbiased persons can judge whether the directors are likely to pull the company through its difficulties. The 10,000£ per annum held forth in October, 1881, as the probable income in four or five years from cinchona alone, it will be observed, had dropped in July, 1883, to 6750L, and was only bolstered up to that sum by assuming a yield of bark 50 per cent. in excess of that estimated in 1881. The 40 ton crop of coffee shadowed forth in 1881, was estimated in 1883 as 6 tons, and even this quantity has not been realised. Since the latter date, as I have already said, no mention has been made of either cinchona or coffee; but we are told that something fabulous is to be made out of the indigenous weeds of the country, and upon this the directors have staked their reputation and the remaining funds of the company.

I subscribe my name in full, and I trust anyone who may dispute my facts or figures will do the same.

C. STEPHENSON.

London, March 25.

COPPER ORE STANDARD.

SIR.—I have to thank your correspondent, Mr. John Roberts, M.E., for his reply to my letter of the 8th on the above subject; but I am sorry that he has not followed out his examples in the full, after giving the basis on which the calculations are made for ascertaining the standard of different produces, and the rule upon which any other standard can be obtained. He gives us two examples based upon the sale Feb. 27, 1883. See his letter. What is the standard of 6 per cent. produce on the bases referred to above? According to his letter 83L 6s. 4d. is the amount which governs all produces otherwise than 9 per cent. Thus, 83L 6s. 4d. divided by 6 per cent.= 13L 17s. 8d., plus the standard for 9 per cent. gives the answer 95L 15s., which amount shows a value of 3L 5s. 10d. for 6 per cent. produce ore. I should like to know how it shows a value of 3L 5s. 10d. for 6 per cent. produce? He also states that the standard is the price of the fine copper in the ore plus the returning charges. This being the case, if I take the price given for the fine copper in the ore at the sale referred to above, and add to it the returning charges, 4s. per ton, upon 11 1-9th tons of ore, this being the number of tons of ore of 9 per cent. produce required to make 1 ton of fine copper, I should leave the standard of 9 per cent. thus—55L 19s. 11d., the value of fine copper in the ore at the said sale, plus 24L 10s., the returning charges on 11 1-9th tons of ore, equals 80L 9s. 11d. as the standard for 9 per cent. produce, instead of 81L 17s. 4d., given in your valuable *Journal* as the average standard of 9 per cent. produce of the said sale. I trust it will not be troubling your correspondent too much to try and make these points clear, and that he will also note that he gives not the least clue how to get at the standard for 9 per cent. produce when the produce of the sale is above or below that figure.—*Morriston, March 24.*

C. W. J.

YEOLAND CONSOLS MINING COMPANY.

SIR.—You inserted for me in the *Mining Journal* of Feb. 9 some comments upon the affairs of the above company, in which I am personally interested. Since then I have received evidence of a nature so conclusive that the property of the real investors is being rapidly made away with that I would beg you to allow me space for a few additional remarks upon the subject. No *bona fide* shareholder could inspect the pretence of work made at the mine during the last two years, with an old portable engine and by the employment of a few hands for a week or two before the annual meeting of the company, without the conviction that for all prospect of his ever receiving any return for his invested money he might as well have thrown the latter overboard at sea. He could see at a glance the real value of the directors' professed intentions of applying water-power—in one year by carrying it in the usual manner in a shoot across the hollow, in the next by means of a visionary system of pipes; he could see what a mere fraction of their outlay has from the commencement been devoted to useful mine work at all, and what an insignificant asset the removable plant will form should a wind-up take place and the mortgages appear upon the scene. The credulity of the latter having been exhausted the directors now revert to the shareholders, hoping to induce them to pay further calls, and it was doubtless in order to facilitate response thereto that the valuable report of what is again "going to be done" at the works was sent for insertion in your intelligence columns of March 15.

It may be instructive to the liquidator to note how far these high-minded intentions have been acted up to by the date of the wind up; their professed object—the working of the mine—such as it is, would have been attained more than a year ago had the shareholders' money been more judiciously expended. The whole benefit of such fixed works as have been executed will pass not to the real investors but to the promoters and others, including perhaps the receiver in bankruptcy, representing one who still holds shares, and was present at the last meeting of the company.

Of course, part of the scheme for maintaining the credit of many concerns is the sending weekly for publication an imaginary share quotation, designed to excite belief that the stock is marketable, or even carrying a premium. Judging from my own fruitless attempts, and from what is recorded at Somerset House, it is certain that no *bona fide* investor in this undertaking has ever been able by disposal of his shares, at whatever sacrifice, to sever his connection with the concern.—*Junior United Service Club, March 22.*

J. U. S.

LEAD AND BLENDÉ MINING IN THE LAKE DISTRICT.

SIR.—In again asking you for a small space in your valuable *Journal* I must depart somewhat from my usual custom, and instead of giving notes on the various mines in this district I will confine my remarks on this occasion to one mine.

A very important event in the annals of lead mining in the Lake district took place on Saturday last—the starting of the new pumping-engine at the celebrated Brandley Mines, near Keswick. It was not generally known in the neighbourhood which day the formal opening was to take place, or in all probability the influx of visitors to the mine would have inconvenienced the officials. However, I got the "tip" that Saturday was the day fixed, and accordingly I wended my way to the mines. I was rather late to see the opening ceremony, and on my arrival found the machinery in full work and a torrent of water being discharged from the pumps. I could not help noticing that the whole of the machinery and erections are of the best possible kind, and reflect great credit on all concerned. From the fragments of a broken bottle laying by the pumping beam I gathered that the time-honoured ceremony of "christening the engine" by breaking on it a bottle of wine had been performed, this duty having been fittingly undertaken by the Chairman of the company—Mr. Crank, of Liverpool—who afterwards presided at a banquet given to the workmen in one of the newly-erected buildings on the mine.

About 100 sat down to partake of the feast, including the directors, engineers, and workmen. A very enjoyable afternoon was

passed, and masters and men appeared thoroughly to enjoy themselves. Numerous toasts were the order of the day, and these were received uproariously by the guests. The toast of the day was naturally "Success to the Brandley Mining Company," and on this head the directors could not fail to be satisfied, as all the old workmen are unanimous in their statements that in the bottom of the mine there is untold wealth. I need not again trouble you with my testimony on this, as a short time will now prove by actual survey that the Brandley Mine has a rich body of ore to work on, such as is not often seen in the richest of our mines. In furnishing these particulars I would observe that I did not take official notes of the different speeches and statements made at the meeting, but merely looked on from an unobserved position. I am, therefore, unable to do justice to the spokesmen, but all appeared to be in the best of spirits, and one member of the board gave vent to his feelings in a poetical outburst, composed, I am informed, specially for the occasion.

I was delighted to see a large heap of very fine lead lying on the surface, obtained from the Salt Level. Any mine might envy such a heap of ore; but said an old miner to me when I was looking at it, "The vein in the 50 is ten times as good as that." As the mine will now be rapidly drained I hope soon to have the pleasure of troubling you with details as to lodes exposed to view, and these, I am sure, will be of such magnitude as to warrant the assertion I have before made that the Brandley is one of the best lead properties in the North of England. Some of the other mines in the neighbourhood have improved; notably the Threlkeld Mines and the Barrow Mines, but I will refer to these in my next article.

SKIDDAW.

March 27.

POLBERRO MINE (ST. AGNES).

SIR.—Permit me to say that it is quite true that the rich Pink lode discovered in the Trevaunance Mine passes through the entire length of Polberro; and further, that Penhalls levels on this rich lode have been driven close up to Polberro boundary, leaving no doubt of its value to the Polberro Company.

JOHN B. REYNOLDS.

London, March 28.

GREEN HURTH MINING COMPANY.—The annual meeting of the shareholders of this company was held on Tuesday at the offices, Westgate-road, Newcastle—Mr. J. C. Swan presided. The balance-sheet and reports were adopted. The Chairman said that during the past year they had been able not only to maintain their dividends but also to somewhat improve their financial position, and to carry over a larger balance than they did in the previous year. They had during the year raised, roughly speaking, 100 tons of lead more than in the previous year. The cost of raising the lead had been £900 less—in fact, they had made a reduction in the cost of production per ton. They had discovered No. 1 vein going north, which promised to be very rich, and they had also begun to open out a drift going towards the old workings. In reply to questions, the Chairman said that at the end of 1882 4061. 11s. 6d. was carried forward, which, with 5263. 6s. 7d., made at the end of 1883 an available balance of profit of 56691. 18s. 1d. The capital was only 1920*l.*, and for certain repairs, renewals, and improvements they had drawn upon the revenue. They had divided 4800*l.* in dividends during the year. Efforts were being made to obtain a reduction of the royalty. Messrs. T. Sheldon, T. B. Barker, and Lieut.-Col. Monks were re-elected directors. It was resolved that in future the directors should be paid 200 guineas per annum for their services. The meeting closed with a vote of thanks to the Chairman.

MINERAL RESOURCES OF THE UNITED STATES.—We were enabled some time since to give from the advance sheets a summary of the statistical report upon the present condition of the Mining Industries of the United States, transmitted June, 1883, to the Hon. J. W. Powell, the Director of the Geological Survey, by Mr. Albert Williams, jun., the chief of the division of Mining Statistics and Technology. The volume has now been issued and is obtainable, as well as all other publications of the Survey. Amongst the acknowledgments we note that Mr. Charles Kirchhoff, jun., editor of the New York Engineering and Mining Journal, who has had special charge of the statistics of copper, lead, and zinc; Mr. C. G. Yale, editor of the San Francisco Mining and Scientific Press, who was placed in charge of the Pacific Division; and Mr. F. F. Chisholm, of Denver, who collected data for the Rocky Mountain region, and who has contributed valuable correspondence to the *Mining Journal*, are specially referred to as having been indefatigable assistants. The article on the Useful Minerals of the United States, by Mr. J. C. Smock, is one of the most elaborate and interesting tabulated statements yet published, and will be very generally referred to.

FOREIGN MINING AND METALLURGY.

Prices have been still tending downwards in the French Iron Trade, and a quotation of 6*l.* per ton for iron is now generally admitted at Paris. As a consequence of this state of things the forges and blast-furnaces in the North and East of France have decided to make as large reductions as possible in their production. The condition of the German iron trade is still not very brilliant, and it is announced that one establishment in Silesia has made a fresh reduction in bars. The production of rails in the Austro-Hungarian Empire in 1883 is officially returned at 246,650 tons, as compared with 328,005 tons in 1882, showing a falling off of 81,355 tons last year. Plates were made to the extent of 181,020 tons in 1883, as compared with 167,886 tons in 1882, showing an increase of 13,134 tons last year. Contracts have just been let in Italy for 18,000 tons of Bessemer steel rails. Messrs. Bolckow, Vaughan, and Co. (Limited) delivered the lowest tender for one lot of 5000 tons, which they undertook to supply at 5*l.* 18s. 2*d.* per ton, delivered at Genoa. The Union of Dortmund took another lot of 5400 tons at 5*l.* 14*s.* 7*d.* per ton, while Bochum contracted for 5080 tons at 5*l.* 14*s.* 9*d.* per ton. It appears that at the close of 1883 contracts for 37 locomotives, required for Italian railways, were in course of execution at Italian works. Italian industrials are also now engaged upon a large number of carriages and trucks to meet the growth of Italian railway traffic.

The improvement recently noticed in the Belgian Iron Trade has been maintained, but it cannot be said that it has made any further progress. The general state of affairs shows some improvement as compared with the condition of business at the close of February; but it has not changed materially during the past week. Orders have come to hand, and it is, of course, a subject of congratulation to see most of the works more or less well employed. At the same time the blast-furnaces have experienced some difficulty in disposing of their production at Charleroi, and it is proposed accordingly to reduce the number of furnaces in blast. The forges have some orders in course of execution, but they are still not fully employed; the construction workshops are also complaining of inactivity. The steelworks are pretty well employed. In addition to an order for 12,500 tons of steel rails which it has obtained in the Argentine Republic, the John Cockerill Company has secured an order for 300 tons from the Upper Italy Railway Company. Speaking generally, quotations have been maintained without much difficulty; English casting pig has been held with a little more firmness at 2*l.* 1*s.* to 2*l.* 1*s.* 6*d.* per ton. No. 1 has remained at 4*l.* 16*s.* per ton, while No. 2 has been weak at 5*l.* 8*s.* per ton. Ordinary girders have made 5*l.* per ton. Plates have remained at their former level—No. 2 at 6*l.* 6*s.* per ton; No. 3 at 7*l.* 2*s.* per ton; plates of commerce at 8*l.* 1*s.* per ton; and No. 4 at 10*l.* 6*s.* per ton.

The condition of the Belgian Coal Trade appears to have become rather more favourable upon the whole. Firmness has become the order of the day, and stocks are being reduced both at Mons and at Charleroi. This appears to have been the result of strike in the Anzin district, which has exerted a sensible influence upon the Belgian markets. In the Borinage the stocks held have entirely disappeared in consequence of the considerable and regular movement of coal to France. The Trieu-Kaisin and Americain Collieries have been dispatching of late nearly 60 trucks of coal daily, and, of course, such deliveries as these have not been without their effect

upon stocks. Quotations have not varied materially upon the Belgian markets notwithstanding the close approach of April. Coke has been held at about 10*s.* 6*d.* per ton. In the week ending March 16, the number of trucks carrying coal and coke which passed over the Belgian State Railways was 18,153, as compared with 18,799 in the corresponding week of 1883. The tone of the German coal trade has been rather weak, although business has been done at late rates. More and more considerable quantities of coal have been forwarded from the ports of the Rhine to Holland and Belgium. The Grand Mambourg-Sablonnière Collieries Company (Belgium) realised last year a profit of 12,726*l.* Of this sum 960*l.* was applied to the payment of dividend at the rate of 16*s.* per share.

COAL IN INDIA—THE SINGARENI COAL FIELD.—NO. II.

By WILLIAM KING, B.A., D.Sc.,
Deputy-Superintendent Geological Survey of India.*

The borings were subsequently carried out by Mr. Heenan, the mining engineer of the Nizam's Department of Public Works, and I had the good fortune to visit the place once more while he was at work. On this occasion the bore-holes indicated that there are other seams besides the one I had found. As to ascertaining the quantity of coal likely to be got out of a field like this the calculation is beset on all sides by such pit-falls as failure in continuity of the seams, doubts as to whether the seams are always the same, and variability not only in the thickness of the seams but in their composition. Further in our examination of the lower Gondwana formation as it extends down the Godavari Valley, from the Central Provinces, a tendency is observable in the Barkars to hold less and less coal, as though they were thinning out or dying away to the southward. Hence the chances are that an outlying pocket of the lower Gondwanas, such as this little area is, might only hold fitful and capricious seams. On the other hand, it is possible enough for such a pocket to be a rich one, and I am bound to state that such appears to be the condition of things here. Be this as it may Mr. Heenan completed his explorations, and in 1875 he prepared a *resume* on Coal in H. H. the Nizam's Dominions, in which, among the accounts of other fields, he gives an extremely encouraging sketch of the capabilities of Singareni. To this *resume* I am indebted for the data and calculations selected, which I shall take the liberty of discussing *seriatim* as closely as possible by the light of my knowledge of the behaviour of the Damuda formation and its groups in the Godavari Valley.

For convenience of work and other causes Mr. Heenan examined the field in two parts—a northern one, in which the outcrop occurs, and a southern one. He put the bore-holes down in the first portion over an area of 1*½* square mile, outside of which there is still a good deal of Barkars, and in the southern part he bored over about 1*¼* square mile, leaving a similar selvage of sandstones all round. In the northern half of the field there are four seams of coal, the uppermost having an average thickness of 6 ft., the next two an average thickness of 3 ft. each, and the bottom one (at 151 ft. below the surface) being sometimes 3*½* ft. thick. The bore-holes appear to have each pierced the four seams, so that the calculated area is the same for each. Indeed Mr. Heenan specialises the bottom seam as having this area, though he does not venture to estimate its average thickness very closely, as it is an uneven lenticular bed thinning out rapidly at the edges. In the southern portion the four seams are still extant, but they vary in thickness and depth. Mr. Heenan says of the capabilities of the seams—"The upper, or King's, seam extends over an area of 1*½* square mile on an average thickness of 6 ft. throughout, and allowing one-third for pillars, &c., there will be 5,500,000 tons of workable coal." This tonnage is calculated as follows:—A cubic yard of coal being equal to 1 ton weight, 1*½* square mile gives 4,646,400 tons. The seam is 6 ft. thick, which will give double the number of cubic yards, or 9,292,500 tons. It is usual in coal mining to leave about one-third of the coal in the form of pillars or blocks for the support of the roof, which amount being subtracted from the above tonnage leaves 6,195,200 tons, rather over Mr. Heenan's estimate. There is always an enormous deal of waste in working coal, especially with Indian coal, while there is sure to be a lot of poor shaly stuff which will not come up to the requirements of railway fuel. I would, therefore, subject the amount given above to a further reduction of one-third, when the result would be 4,130,134 tons, or (say) 4,000,000 tons of workable coal. Mr. Heenan next says:—"The second and third seams extend over a like area, on an average thickness of 3 ft. each throughout, and will produce 8,500,000 tons of workable coal." There is some mistake here; the aggregate thickness of the two seams is only 6 ft., and the area is the same as in the upper seam, hence the probable out-turn must be the same, or 4,000,000 tons. I will not enter into Mr. Heenan's account of the bottom seam; he clearly had not obtained sufficient data for a fair estimate at the time of publishing his *resume*. He estimates, however, that there may be 8,500,000 tons, which I very much fear will be found above the true quantity. Whatever it be I refrain from making any guess about it. Suffice it to say that the seam is sometimes very thick, and it may give such thickness of good coal in the area defined by the bore-holes as to keep the total tonnage of the northern part of the field well above 8,000,000 or 9,000,000 tons. In the southern area the lower seam thickens out to over 50 ft. in some places, but the quality of the coal is said to be variable. The three other seams are slightly reduced along the western edge of the field. The area is somewhat larger, and Mr. Heenan calculates on a corresponding increase in the probable out-turn, which I would, however, reduce to about the same amount as in the northern field. On the whole, the possible out-turn of good coal may be reasonably reckoned as 16,000,000 or 17,000,000 tons for the whole field, which is indeed vastly larger than I ever expected for so small an area. I am bound to be as cautious as possible in a calculation of this kind, but I must at the same time give due credit to Mr. Heenan's stated facts concerning the thicknesses and areas as shown by his boring explorations. All that we feel justified in doing is to weigh his opinions on the quality of the coal in the seams and the likelihood of their being so permanent in their thickness as he seems to think they are, and I think the reductions I have made on his total estimate of 46,500,000 tons will meet the contingencies likely to be encountered.

The quality of the coal is the next point of interest. That which I myself obtained at the out-crop was tolerably light and compact, not shaly, but charged slightly with patches of powdery charcoal, breaking into big lumps, and having the bright lustre of ordinary coal. After it had been dried in the sun it soon made a great blazing fire in front of my tent, which was kept up all night by the people as being something new in that country. The next morning all that remained was a heap of powdered ashes and some fragments of harder cinder, which were easily knocked into powder. An analysis made at the Survey laboratory in Calcutta gave:—Fixed carbon, 62*½*; volatile matter (moisture, 6), 22*½*; ash, 15*½*=100.0. This shows a very fair style of Indian coal; the 15 per cent. of ash is, however, just within the limit of coal having a ready sale in India, while the proportion of fixed carbon is much higher than that of average Raniganj coal. The moisture is lower than is usual with Godavari coal. Subsequently the coal underwent more practical tests. A shaft was run down 200 ft. away from the out-crop to 60 feet, which reached the bottom of the uppermost seam. About 300 tons were extracted and sent to Hyderabad, where it was found to work very satisfactorily both in the stationary engine and at the workshop forges. On the Madras Railway about three years ago experiments showed that the coal is very hard, makes little dust, and leaves very little ash in the smoke-box; there was no difficulty in making steam with it, but it was found to make a great deal of ashes in the ash-pan, for which of course special arrangements can be made.

The great point about these experiments is that the coal was not thrown aside as being of no account. Mr. Trevethick, in his report, calls it a good serviceable fuel, and says "that if the facilities for carriage are such as will admit of its being delivered to consumers at a reasonable rate it should be well worth working." The coal of the upper seam has only been practically tested, but by all accounts

that of the other seams will be found to be of similar quality. Mr. Heenan gives the following analysis of coal from the lower seam, in which the percentage of ash is remarkably low:—Fixed carbon, 66*½*; volatile matter, 23*½*; ash, 11*½*=100.0. In considering now the means of getting this coal to Madras, or indeed having it transported anywhere, the depth at which it lies, the nature of the locality, and the means of approach are matters of great importance. The lowest seam is only 150 ft. from the surface in the northern part of the field, and it never runs beyond 250 ft., so that the pit shaft or shafts will not involve any extraordinary sinking. Then there will be no great demand on pumping apparatus; the locality is a dry one, being in a very small drainage basin of about 37 square miles, at the head of one of the minor feeders of the Munier tributary of the Kistna river. The situation, as I have already said, is favourable, owing to its being in the low country, and thus easily accessible from the wide open plains of Kummummet. It is of course a jungly region of secondary forest, but this will be of advantage in supplying timber for the works and railway. So convenient is this field in every way that I used to dream of it thus:—If the Nizam's Government do ever carry out a system of railways as was then proposed between Hyderabad, Chanda, and the Kistna frontier via Hanikonda, why should not a Zemindar—say, a European—Singareni import his mining plant *via* Coconada and the Godavari, sink his pit, lay down a tramway from the colliery to Kummummet, and supply the railway at Rs. 5 a ton? I really think still that this might be done at a profit.

This brings me easily to the problem how to get the coal out of the place, and lay it down at Madras at a fair rate. In the Government enquiry or correspondence of 1879 on the capabilities of the Singareni and Godavari coal; Mr. Trevethick stated that the cost of the Godavari coal should not exceed Rs. 15*½* per ton, stacked in the Royapuram yard, to attain the same result as is got by using patent fuel at Rs. 22-11-9 per ton. I very much fear that since then the price of patent fuel has gone down somewhat; in which case Singareni must yield its fuel at even a lower price than Rs. 15*½*. The first point is as to what the price may be at the pit's mouth. The coal already mentioned as having been sent down to Madras cost Rs. 8-8-2 per ton at the mouth of shaft. Of course, the shaft is only a temporary affair with no appliances in the way of machinery, and the coal was got out in the most primitive manner at a price very considerably above what could be added at proper colliery works. Coal is sold at pit-mouth in Raniganj and other places on that side of the country sometimes for so low a price as Rs. 2-8 or Rs. 3 per ton. At Warora, in the Central provinces, coal is sold to the public at Rs. 7-8 per ton unscreened; screenings or small coal at Rs. 4; the price to guaranteed or State railways being lower.

Coal is carried in Bengal and Central India by rail at about Rs. 2-5 per ton for 100 miles. The Madras Railway rate is much higher than this, and the Nizam's State Railway carries it for about Rs. 3-2. However, perhaps both railways will carry it at a lower rate when they have to carry it in any quantity. Not to pare things down too finely let the 3-2 rate be taken, and this will raise the price of coal at Bezawada to Rs. 8-8. There is then the water carriage for 274 miles by canal. Referring again to the Government correspondence of 1879, it appears that with proper boats and an organised system of transport the rate should not exceed 2 piers per ton mile, which will make the charge Rs. 2-13-8 per ton for the canal route, or Rs. 11-5-8 as the price of the coal at Madras. A further slight charge must be added for carrying and stacking at Royapuram yard, which certainly will not run the price beyond Rs. 11-8 a ton, well within the Rs. 15*½* laid down by Mr. Trevethick. It must not be forgotten that Rs. 6 is the proposed prime cost in this calculation, not Rs. 5 as I would have it. The present normal annual consumption of coal on the Madras Railway is only somewhere about 12,000 tons, equivalent to 16,000 tons of Singareni coal; hence, if there were only this railway to feed and its fuel reserves held out at their present rate, the Singareni field might be expected to last for over 1000 years. The fuel reserves are uncertain, the Madras Railway Company may require more coal, the South of India Railway is ready to take very large amount, the eastern system of Nizam's railways will require fuel, and altogether it is not improbable that this annual demand for coal might run up to 50,000 tons in a very short time. With such a drain this field might hold out for 350 years; perhaps under certain views quite long enough for us in India. On any view, if a greater demand arise, there are the other fields to fall back on.

I hope I have now shown that Singareni is the immediate field for opening up, that 17,000,000 tons of coal may be reasonably expected to be got out of it (if not the 46,500,000 tons of Mr. Heenan's estimate), and that a railway between it and Bezawada will help to load coal in Madras at Rs. 11-8 per ton. The other fields in the neighbourhood are Sivawaram and Madaveram. They with the so far unfruitful field of Beddadanoal are patches of Barkars, situated on different sides of a large area of Kamthi strata, which may be called the Ashwaraoopett region. This area of Kamthi is about 240 square miles in extent, and it lies alongside the zig-zag portion of the Godavari, between Bhadrachellum and the gorge of the river. Thence it stretches down towards the Ellore and Yernagudem part of the Godavari District.

Sivawaram and Madaveram are situated at the north-east angle of this area, on or close to the bank of the river; they both contain seams of coal of greater or lesser importance. Away on the western edge of the area, near Chundrungunda and Kunigiri, there is another patch of Barkars, which has not, however, giving any signs of coal as yet. The probability is very strong that between this and Sivawaram there may be a continuous and thus extensive field of the same rocks underlying the Kamthi. This part of the country is entirely in the Hyderabad territory, and Mr. Heenan made a few bore-holes in the neighbourhood of Sivawaram. He found that there is a seam 1 ft. thick at 240 ft. from the surface, a 4 ft. seam at 272 ft., and a third seam 6 ft. thick at 313 ft. The coal of the second seam is reported as tolerably good. All this shows that the prospects of the Sivawaram country are favourable; the depth is at the same time considerable for Indian coal measures.

The Beddadanoal Barkars undoubtedly stretch away under the Ashwaraoopett country or into the Hyderabad lands, and perhaps also down under British ground towards Ellore. The depth to which borings would have had to be carried had they been started in Kamthi, and the incertitude with which I should have had to point out sites for such operations, practically frightened me from advising Government to proceed further in the work of exploration. I am bound to admit this, in the face of such vastly bolder ventures as were carried out—frustrously as far as striking coal rocks was concerned—in the Narbada Valley. There, however, the question for or against the occurrence of coal at a reasonable depth, in a region advantageously placed for the railway, was practically decided; and it would have been for the best had a similar end been gained in this part of the Godavari district. This may yet be called for; it would be eminently satisfactory for us to have a decent field of our own within perhaps 20 miles of the canal, somewhere in the neighbourhood of Ellore; and on this last view I can only now say that before leaving this Presidency, I hope to prepare a notice of the conditions of the Damudas in that region in case of more extended boring operations. In the meantime, however, too much attention cannot be devoted to the development of the Nizam's fields, and I trust this description of them may lead to increased interest in them, not only with the public and the Government here, but with the Nizam's Government.

BRITISH MINING.—It is stated that Mr. Robert Hunt's—the Keeper of Mining Records—large and comprehensive work on the History, Discovery, Practical Development, and Future Prospects of Metallic Ferous Mines in the United Kingdom, under the title of "British Mining," will be published early next month by Messrs. Crosby Lockwood and Co., Stationers' Hall-court.

ANOTHER CURE OF BRONCHITIS, COUGH AND COLD (THIS WEEK) by DR. LOCOCK'S PULMONIC WAFERS.—Mrs. Shepherd, 19, South David-street, Edinburgh, writes:—"March 17th, 1884. I have always recommended Dr. Locock's Pulmonic Wafers to my friends for Bronchitis, Coughs, and Colds, and received as grateful thanks as though I had compounded them." They taste pleasantly, and effect a rapid cure. Price

REPORT FROM CORNWALL.

March 27.—Will there be any rise in the tin standards before Easter? That is a point upon which opinions will and do differ. There is a general belief that the figures of the month will be of a very favourable character, and that being so, in the natural course of events the rise, after all that has passed, should take place forthwith. But so short a time will elapse between the end of the month and the commencement of the disturbing influence of the Easter holidays that the prospect of immediate improvement seems hardly so decided as we could wish to see it, and indeed it would be better that there should be the delay, and the advance when once made adhered to, than that there should be any reaction or even check in the upward tendency. These are points that should be borne in mind by any who may be tempted not only to feel disappointment but act upon it should April not open with an advance.

Like good men of business, the tinnsmasters are quite capable of keeping their own counsel, and probably it is the non-recognition of that fact which has caused a little incredulity as to their attitude towards the tin market. There is really no reason, however, to doubt that substantial stocks are in hand waiting for higher prices, nor that there is more combined action among them than has been always usual of late. They never can expect to rule the market again like they did in the "good old times;" but there really has come about such a relationship between foreign supply and the demand for home produce that the game is much more in their hands now than it has been for a long time past. How far what is in store may be discounted beforehand is a question not easy to answer; but there must be some substantial good in any event, and the way in which shares are held show that this is very generally recognised.

We are disposed to believe that some permanent good results will accrue to mining generally from the manner in which the dues question has been taken up and dealt with of late. We are not, it is true, very much nearer, to all appearance, the general acceptance of the principle of dues on profits, and on profits only; but there certainly is something gained in the manner in which it is suggested, and in many cases accepted, that dues should cease while a mine is making calls—that the adventurers should not be called on to pay for the privilege of making a loss. It seems to us that we have really attained a position in this direction which should render it quite feasible, if not easy, to make this a recognised principle in future. In the early days of mining the lord always took his part with the adventurers, and if we can hardly expect him under the altered circumstances to become a shareholder now, at least he can share their lot to the extent indicated, which involves no personal responsibilities.

Though the directors of the Redruth Mining Exchange, at their annual meeting, had to express their regret that their dividend was not so large as in the previous year, yet most people will be of opinion that in these days a dividend of 8 per cent. is no way to be despised. Even Mining Exchanges cannot hope to pay 15 per cent. every year, though our Redruth friends appear to be sanguine that at no distant date they will be able to repeat the process, and certainly we are disposed to agree with them. The little difference of opinion as to this same committee representing both the Exchange Company and the Exchange itself might possibly be regarded as not unnatural, where two sets of interests are announced to be represented; but there does seem to be an advantage in having the one governing body, and there really is no reflection upon the manner in which things have been conducted in the past.

There ought to be good things in store, not merely for mining, but for mineral interests, in the widest sense, in connection with the approval by Parliament of the scheme to connect the Liskeard and Caradon Railway with the North Cornwall line. No one district of Cornwall has been left so thoroughly out in the cold as that which is traversed by this "mining link," and the capabilities of development are really very large indeed, so far as mining enterprise is concerned—in fact, there are large tracts here that are practically virgin ground.

REPORT FROM DERBYSHIRE AND YORKSHIRE.

March 27.—Short time is now the rule at the coal mines in most parts of Derbyshire, and no change for the better can be looked forward to for some months to come. A large portion of the coal raised in the county is for household and gas purposes, and the worst period of the year for these has yet to come. Prices have come down, so that owners have as much as they can do to make both ends meet; so that under such circumstances it is not surprising to find some of them seeking a little relief by a reduction of wages. The men at the Renishaw Colliery have been on strike about six weeks against a reduction of wages, and have been living on what they could obtain from the miners in their own and other districts, one week's distribution having amounted to 2s. 6d. per head. It is, therefore, not likely that the strike will last much longer under such trying circumstances. The Unstone Coal and Coke Company have also given their men the usual notice to determine the existing agreement, and it is understood that should the men not agree to a reduction of wages the colliery will be set down until better times, but for which the men are not in a position to wait. Most of the other owners of collieries are expected to adopt a similar course, as none are prepared to continue working their places at a loss.

The London trade has been comparatively quiet for some weeks past, but the Derbyshire collieries have had their full share of what business was done, and of course continue to do so. Clay Cross continues to take the lead, but it is closely followed by Langley Mill, Blackwell, and other places. Prices in the Metropolis have certainly come down, but they do not bear any comparison with what is charged at the pits, or sold by the agents in the Metropolis, for just now larger quantities are sent them than are required, and this of course brings the price down, much to the advantage of the merchants, whose interests are certainly not identical with those of the colliery owners. The quantity of steam coal being sent away from the districts north and south is by no means large, for comparatively little is sent to any seaport for shipment, seeing that there is no port direct by any of the railways at a moderate distance. The local consumption, however, is large, and keeps up well, for the make of pig is kept up to the average, although prices are by no means good. But this is not so much a matter of consequence as it is in other districts, seeing that in Derbyshire the makers of pig are also large consumers of it. This is especially the case at Staveley, Stanton, Sheepbridge, and Clay Cross, where there are very large foundries, some of them being noted far and wide for all kinds of pipes, pillars, cylinders, and other specialities in the shape of heavy castings.

Some little improvement has taken place in a few of the Sheffield branches of trade; but several are still very quiet, so that there are a good many of the workmen unemployed, while others are on short time. The armour-plate mills still take the lead, so far as activity is concerned, and both Brown's and Cammell's are as busy as they well can be on them, and in all probability will be so to the close of the year. In ordinary plates for ship-building there is not so much doing, and the same may be said with respect to those of boilers, whilst the wire mills are the reverse of busy. Makers of both Bessemer and crucible steel have kept fairly going, the former in both ingots and billets, and also in some special qualities for springs, not so much, however, is now required for rails; but there has been no material failing off as regards the demand for axles and tyres, and other descriptions of railway material. Crucible steel, for general cutlery purposes, has not gone off so well; but in wheels and other castings a good output has ruled. The cutlery houses all round have not done so well since the commencement of the year, and the leading houses have had as much as they could do to keep their ordinary hands fully employed. Small manufacturers and those engaged in the inferior qualities of table, pocket, and pen knives have not done so well, many of the men being on short time. Tool steel has been in tolerably fair request for edge tools and files have met with a fair sale of late in the home, as well as in other markets. A fair business has prevailed for steel wheels in sections by the leading makers, and other branches seem to make fair progress. Several of the foundries are better employed than they were even recently, and, although machine castings are rather

quiet, there is now a steady business doing in water and gas pipes, kitchen and cooking ranges, ornamental stoves, grates, and general house castings.

The Coal Trade of South Yorkshire, so far as household qualities are concerned, is still quiet, and the collieries working short time. A fair business, however, is being done in steam coal, a good deal going to Hull for exportation, as well as for the use of the steam vessels connected with that port. Prices, however, are as low as they were, steam coal being still quoted at from 6s. 6d. to 7s. per ton at the pits. A full average tonnage of late has gone to Goole, principally for London, Plymouth, Gravesend, and other of our home ports. In engine coal for the Lancashire manufacturing districts in particular a moderate business has ruled over the Manchester and Sheffield Railway. The coke trade has kept up well, the output being large, considerable quantities being sent into Lincolnshire, Derbyshire, and other iron-smelting districts.

REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

March 27.—The amount of work doing at the collieries does not show an augmentation upon last week; prices, too, are not advanced. Indeed, such a tendency would be impossible now that the owners have determined, as I last week stated, to bring down wages. What amount of reduction may be determined upon is at present wholly problematical. There are already indications of resistance by the men, yet a reduction in some form or other is regarded by the market generally as inevitable. Prices this week are quoted at from 7s. to 7s. 6d. for Staffordshire mill coal, and 6s. for forge. House coal from the Chase is quoted 10s. for best deep, 9s. for deep one way, and 8s. for cobbles. Furnace coal (Staffordshire) is 9s. 6d. to 10s. From the Chase forge and mill coal can be bought at lower prices than those of South Staffordshire proper by from 6d. to 9d. per ton. Native pig-makers report that current output is going away steadily from the furnaces; new business is, however, largely postponed until the Quarterly Meetings, which are fixed for April 9 and 10. Willingsworth (native) pigs were quoted 42s. 6d. per ton, cinder qualities are 37s. 6d., and some makers are even willing to accept 35s. Orders for manufactured iron are irregularly distributed, but do not show an increase upon the week. Marked bars are 8s. 6d. to 7s. 10s., an medium qualities 6s. 15s. to 6s. 10s. Tank-plates are 7s. to 7s. 10s., and strip iron is 6s. 2s. 6d. to 6s. 7s. 6d.

The annual meeting of the Chillington Iron Company (Limited) was held on Saturday at Wolverhampton. The Chairman, in moving the adoption of the report, accounted for the loss of 54,497, upon the year's working—by depression in trade. However, everything the company produced was now increasing in popularity. Referring to a statement as to alleged underselling by the company, he denied that such allegations had any foundation. As to the recommendation contained in the report to exercise the borrowing powers of the company to pay off temporary loans which had been negotiated to provide cash capital, he stated that the firm had really never had any working capital independently of these loans. In the discussion which followed it was mentioned that the total losses of the company amounted to 50,000*l.*, and that it had not paid any dividend since 1876. The motion for the adoption of the report was met by an amendment that a committee of investigation should be appointed to enquire into the company's affairs. The amendment was, however, lost, and the report was adopted.

The colliers in the Dudley district are again becoming unsettled. A meeting of the disaffected was held on Tuesday night, under the presidency of Mr. H. Southall, when it was determined—(1.) That we object to a wages board based upon less than 3s. 8d. as a minimum in wages; and (2) that we do not submit to a reduction in the present rate of wages.

The whole of the miners employed at the Clough Hall Collieries and the New North Staffordshire Coal and Iron Company's pits have ceased work, in consequence of some of the North Staffordshire colliery proprietors have given notice for a reduction of wages. The strikers have had a meeting, and have unanimously resolved to resist the demand.

TRADE OF THE TYNE AND WEAR.

March 27.—There is little change in the state of the Coal and Coke Trades. The steam coal collieries north of the Tyne continue to be fairly employed. Shipments to the North of Europe and the Baltic are improving, and there is a good demand for large steam coals. There is also a good demand for bunker and smithy kinds. Some of the gas, coalworks are making short time, but some of the best works are still fully employed. Most of the large coking works are steadily employed, as they hold contracts for all they produce. At second-class works there is short time, and the make is being reduced. The house coalworks are in a worst position at present; the general mild winter in Europe has had a very depressing effect in this branch of the coal trade, and prices on the London and other markets are low. The depression is, therefore, felt severely at the Hetton and Lambton Collieries, and other first-class house coalworks on the Wear. New winnings for coal have been rare in Northumberland and Durham during the past few years; the coal fields are, indeed, well occupied, and the output of coal has been quite up to the demand. Messrs. Strakers and Love, who work one of the most extensive coking fields in Durham, have 7000 acres of coal royalty, and they are now about to sink a new shaft in connection with their works at Brandon. The new shaft, however, will not be used for coal drawing, but as an air-shaft, and it will improve the ventilation of these extensive works. The shaft will be sunk from the surface to the Busty seam, and it will be 12 ft. in diameter when finished. The shipments of coal and coke at Tyne Dock, and at the other shipping places on the Tyne and Wear, have been fair during the week. At Tyne Dock the shipments were 82,000 tons, rather below the average, but still 13,000 tons above the quantity for the corresponding week last year. Shipments of coke to Spain and other foreign ports are improving considerably, still there is a considerable quantity of coke in the market. The reduced make of iron in Cleveland, of course, accounts for this.

The Iron Trade continues steady and firm, and although little advance has yet been got in prices, there is certainly an upward tendency. The greatly reduced make has improved the position so far. There has also been a marked advance in the price of forge iron during the past two weeks. It is expected that the German demand will be materially increased in April. The finished iron trade on the whole is, however, in a bad state, and prices are very low. Bars are from 4s. 17s. 6d. to 5s.; ship-plates, 5s. Pig-iron No. 3 is quoted 37s. 3d., makers ask 38s. The shipments of pig-iron for the week reached 16,415 tons, and 3550 tons of manufactured iron. Messrs. Connal's stock of warrants is 60,737 tons.

Some important experiments have just been concluded, made to test the suitability of basic steel for ship construction. The experiments have been conducted by Mr. William Parker and Mr. H. Cornish, officers of Lloyd's Register Committee. The steel manufactured by the North-Eastern Steel Company, and rolled by Messrs. Dorman and Long, of Middlesbrough, was subjected to various tests by those gentlemen—hot and cold tests, tensile tests, and timber tests—the material was subjected to the same treatment that a ship's frame would undergo in ordinary shipbuilding. As the result of these experiments they have reported to the committee of Lloyd's that so far as the requirements of Lloyd's Register are concerned, steel made by the basic process is equal to steel produced by the acid or hematite process. In accordance with these recommendations the committee have now informed the North-Eastern Steel Company that such metal may be used for ships built under the inspection of their surveyors to class in their society, subject to the usual tests applied to steel plates and angles.

During the past few years a considerable quantity of manufactured iron has been imported into this country from Belgium. These imports are mainly cast-iron girders for building purposes, and they have been brought into the Tyne and Wear in considerable quantities. An attempt is now to be made by some gentlemen in the iron trade on the Tees to secure this trade. Cast-iron girders are to be manufactured there on a large scale, and it is expected that the

makers will be able to sell them at such a price as will enable them to compete with the Belgian iron manufacturers.

The Shipping Trade has not improved much here, outward freights have improved a little, and a few more ships have been got to work, but a considerable number are still laid up in these rivers waiting for better times. There is still considerable excitement about the proposed Shipping Bill of Mr. Chamberlain, but the fierce opposition to the principle of the Bill has calmed down considerably, and there is now more disposition to discuss its provisions. There appears to be a growing conviction that there is a necessity for a Shipping Bill, and a well-digested measure would no doubt have a tendency to save both lives and property at sea. It was expected that Mr. C. M. Palmer, the Member for North Durham, would have an interview during the present week with the Premier, for the purpose of discussing the question, but it now appears that this interview has been postponed in order that some proposals of the shipowners as a body may be taken into consideration.

The Iron Shipbuilding Trade continues in a dull depressed state, and in consequence marine engine-builders are still paying hands off. A considerable number of skilled men have been paid off at Messrs. Palmer's works at Jarrow, and at other works. These men have, however, been absorbed to a considerable extent at other works, where there is still a considerable amount of work on hand. The engineers on these rivers are now seeking for a reduction of wages, and a meeting of delegates was held on Monday, when the question was considered. As we anticipated last week, the men will offer a considerable amount of opposition to the proposed reduction. It was resolved at the meeting that any men coming out on strike shall receive the support of the Amalgamated Society of Engineers. At the great works of Sir William Armstrong and Co., at Elswick, there is much activity in all departments, especially in the gun and gun-carriage department, where a large number of field guns for various governments are under construction. An order has also been received within the past few days for the construction of three 110-ton guns for the British Government. These guns will be the heaviest pieces of artillery in the world. A large new fitting and turning shop has just been opened at these works, and in this shop alone 500 hands are expected to be employed. The total number of hands employed at these works now amount to nearly 5000 hands. Considerable progress has been made here with the extensive shipbuilding yard and steelworks. Steel-plates, and all other necessary steel for shipbuilding will be produced here, and also steel used in the manufacture of field and other guns. The produce of the steel-works will, therefore, be mainly consumed on the premises in the manufacturers now carried out by the firm, and this, of course, will be a great advantage.

REPORT FROM LANCASHIRE.

March 27.—Business in the Coal Trade of this district fluctuates with the variations in the weather, which is an indication that the recent improvement in the demand can only be regarded as of a temporary character. The recent few days of warm weather had a perceptible effect upon the demand for the better classes of round coal for house fire purposes, and in addition to this buyers, in anticipation of some possible reduction in prices with the close of the month, have been holding back orders. The weight of business doing during the past week has, consequently, shown a falling off; pits have only been kept going about three and a-half to four days a week, and even with this limited output stocks have been accumulating. Except, however, that for quantities to clear away stocks under bond sellers in some cases have been open to entertain offers at under current rates, there is no material change in the quoted pit prices, and the leading Manchester firms are making no alteration in their list rates for next month. At the pit mouth prices average about as under:—Best Wigan Arley, 9s. to 9s. 6d.; second qualities, 7s. 6d. to 8s.; Pemberton Four-foot, 7s. to 7s. 6d.; common house fire coals, 6s.; steam, 6s.; forge coals, 5s. 6d. to 6s.; burgy, 4s. 6d. to 5s.; best slack, 4s. to 4s. 3d.; and good ordinary qualities, 3s. 3d. to 3s. 6d. per ton.

For shipment there has been a moderate business doing at low prices, good ordinary Lancashire steam coal averaging about 7s. 3d. to 7s. 6d. per ton delivered at the High Level, Liverpool, or the Garston Docks.

For coke the demand recently has been falling off, but prices are still maintained at about late rates, best qualities averaging 10s. up to 12s., and common coke about 8s. per ton at the ovens.

The question of a reduction in wages continues to be talked of in the coal trade of this district, and no doubt any further general reduction in price would compel some action to be taken, but at present nothing definite has been done in this direction.

In the Iron Trade business all through continues in a depressed condition, and both buyers and sellers seem to be uncertain what course to take with regard to the future. Pig-iron makers still hold pretty firmly to late rates, but there is little or no business offering, except that here and there buyers would give out orders at under current rates. Local and district makers, however, still quote about 4s. to 4s. 6d., less 2*s*, as their minimum price for forge and foundry qualities delivered equal to Manchester; but on the basis of these figures buyers show no disposition to give out orders. Outside brands, such as Scotch and Middlesbrough, are without material change. In Scotch merchants continue to offer at about 3d. to 6d. per ton under makers' prices, and North Country iron remains about as last quoted; but there is little or nothing doing to actually test values. Hematites still meet with only a very slow sale, and 56s., less 2*s*, remains about the nominal price for good foundry brands delivered into this district.

In the Manufactured Iron Trade there is a continued downward tendency in prices, most of the local makers are getting very short of orders, and with outside brands competing keenly in this district they are compelled to take lower prices to secure orders. For good local and North Staffordshire bars, delivered into this district, 5s. 12s. 6d. per ton is about the average price, but lower class local brands are to be bought at 5s. 15s., and Cleveland bars at 5s. 12s. 6d., or even at a little less in some cases. Ordinary qualities of sheets average 7s. 10s., with the better makes 7s. 15s.; hoops, 6s. 5s. to 6s. 7s. 6d.; and common North Country plates and angles 5s. 10s. to 5s. 12s. 6d. per ton delivered into this district. Engineers in this district are kept moderately employed, and in some special branches outside brands continue to offer at about 3d. to 6d. per ton under makers' prices, and North Country iron remains about as last quoted; but there is little or nothing doing to actually test values. Hematites still meet with only a very slow sale, and 56s., less 2*s*, remains about the nominal price for good foundry brands delivered into this district.

REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

March 27.—The local railway bills appear to be making progress in Parliament. The Cambrian Railway invite subscriptions for 20,000*l.* for the purpose of improving the port of Aberdovey. The making of Aberdovey a great port was one of the ideas of the original promoters of the Cambrian railways. It was attempted to make it a considerable fishing port, as well as a point of departure for Ireland, but the panic of 1864 came too soon. Latterly a trade has been started between this port and America by the Aberdovey Export and Import Company. Among the lead mines of Cardigan the Tan-yr-Alle has been quietly successful for a long time. At the present time arrangements are making for its transfer to a Limited company in order to the more vigorous working of the mine. Several fine courses of ore have been worked for a good while, and are still worked.

The manufacturing works along the estuary of the Dee are busy. These are various mining machinery, paraffin, superphosphate, smelting and chemical. The cobalt mine near Rhyl and the manganese mine near Abergele still continue in successful work. The slate depot near Chester is scarcely as much used as it was, the merchants ordering direct from the quarries, where larger stocks are necessarily kept to meet the requirements of sudden orders. The Geologists Association have just published in their Proceedings an interesting account of the geology of the Snowdon district, with sections showing the various groups of strata described by me a few weeks ago. The Association visited the district in their long excursion last summer.

The collieries all keep in work, and we hear less complaints as to

prices. The Mold district is a little neglected, but the special trades of Buckley Mountain coal, bricks, and pottery, are in a tolerably good condition. Opportunity has been taken, and very rightly, of the depression in lead mining to agitate for, and in many cases to obtain, a reduction of rents and royalties, together with a remission of rents while a mine is not paying its way. This rule will have to be applied to all descriptions of mining property, making the mineral owner a sharer of the adversity as well as the prosperity of the miner.

It is the exorbitant dead rents, as well as the high royalties asked for that now to a great extent prevent the further development of the coal resources of North Wales.

TRADE IN SOUTH WALES.

March 27.—Although there is an evident weakness in the demand for second-class qualities of coal, first-class maintain their position with great firmness. Cardiff sent away last week 138,849 tons foreign and 13,469 coastwise; Newport, 37,988 tons foreign and 17,978 coastwise; Swansea, 14,622 tons foreign and about 10,000 coastwise. Prices range from 10s. to 12s. 3d. per ton. House coal is in weak demand, as usual at this time of year. The patent fuel trade is somewhat better. Swansea sent away last week 9791 tons, and Cardiff 2027. The freight market is inactive.

It was stated in the Nautical Magazine, a long time ago, that ship-builders were over-building, and they were warned at the time that the result must show itself in time in a most disastrous manner. Shipowners have sufficient anxiety at the present moment in their endeavour to keep their heads above water without being worried and harassed by the Board of Trade. The following notice, which was affixed at the works of the Castle Steel and Ironworks last Saturday will tell its own tale:—"I regret to inform you that, owing to the bad state of the shipping trade and lack of orders, we are compelled to slack down a certain number of our men, who will be paid up to-night, as per former notice. I trust the slackening off will be merely temporary, as we have a number of ships on the stocks in a forward state, and no doubt we shall get the first chance of a sale. I desire to express to you the regret of Mr. Mowatt at having to part with so many good men, and to assure you that, on the very first opportunity, if you are disengaged, your services will be acceptable. The fall in the price of shipping is so great that it may be necessary to take a lower price for the ships; but, before doing so, we should have to get a firm contract, signed by you or others, for the construction of the vessels at a lower rate of wages, so as to bear a portion of the loss to us. Many builders are now selling at less than cost price merely to keep their yards going; but, as we are free from liability, and the whole of the ships on the stocks, with the exception of one on order, are the property of the undertaking, and everything paid for to date, we prefer waiting instead of selling at less than cost price, which is now being done elsewhere.—For the Castle Steel and Ironworks, SAMUEL LAKE, Manager."

The Jersey Iron and Steel Works were re-started on Monday, and on the same day a blast-furnace which was damped down in 1882 was re-started. Iron was sent away from Newport last week to the amount of 3364 tons, while Cardiff exported 1279 tons. Iron ore has come in at Cardiff from Bilbao to the extent of 14,577 tons, and 2670 from other sources; Newport received 5905 tons from Bilbao, and 1950 from other sources. There is no improvement in prices.

The Tin-Plate Trade is decidedly better. The lowness of stocks has at last placed the whip in the power of the manufacturers, who are selling 1C coke at from 15s. to 16s. per box, while "wasters" readily realise 1s. 9d.

Our remarks on the suitability of Swansea as the site for a technical college were read out at a Town Council meeting this week in that town with evident satisfaction. The present Mayor is a man of great energy and business capacity, and may carry this matter to a successful issue. Wales has not at present her fair share of Government grants for education as compared with Scotland and Ireland by some 9000*l.* per annum, and it will only be an act of justice to give Swansea, in addition to the 2000*l.* which it is anticipated will be given to Aberystwith, a share of the remaining 7000*l.* for the purposes of a technical college. Swansons may claim to be called the metallurgical capital of the British empire.

WAGES DISPUTE IN THE WARRINGTON WIRE TRADE.—For several weeks past the wireworks in the Warrington district have been stopped, owing to a strike on the part of the wire drawers against a reduction in wages. The employers are endeavouring to enforce a reduction ranging from 10 up to 40 per cent., according to the class of work, and this the men are resisting. An attempt has been made to come to an arrangement, but this has failed, and at present there is no prospect of a settlement. The Warrington firms for some time past have been unable to compete with the German manufacturers in the Colonial markets, owing largely to the much higher rate of wages which have to be paid to the English workman; and in the event of the wire drawers persisting in their refusal to accept the reduction it is suggested that fresh men should be trained to the work on the basis of the German rate of wages.

Registration of New Companies.

The following joint-stock companies have been duly registered:—

THE PATENT ANTHRACITE FUEL SYNDICATE (Limited).—Capital 25,000*l.*, in shares of 10*l.* Constructing, working, or using machinery and plant for the manufacture of patented fuel in the United Kingdom. The subscribers (who take one share each) are—W. Cruckshank, 32, Fenchurch-street; T. E. Weigall, 32, Fenchurch-street; C. K. B. Troup, 18, Torrington-square; C. D. Hamilton, 6, Craven-street; G. Cruckshank, 16, Clifford's-inn; R. Condy, 15, Garlic Hill; W. T. Allen, 67, Upper Thames-street.

MUTUAL STOCK AND SHARE COMPANY (Limited).—Capital 20,000*l.*, in shares of 1*l.* The businesses of stock and share brokers and dealers and financial agents, loan and money brokers, &c. The subscribers (who take one share each) are—J. Ambrose, 13, Everleigh-street; J. Holloway, Leyton; P. R. Lescine, Leyton; J. Ruse, Lee; J. Macdonald, 37, Clement's-lane; J. Stephenson, 26, Suffolk-street; F. Haughton, 28, Chilton-street.

THE UNIVERSAL PLATE-GLASS INSURANCE COMPANY (Limited).—Capital 20,000*l.*, in shares of 1*l.* A general insurance business connected with plain and ornamental and other kinds of glass. The subscribers (who take one share each) are—G. A. Harrison Ainsworth, 107, Cannon-street; F. Temple-Allen, 66, Finsbury Pavement; J. T. Watson, 23, Leadenhall-street; J. Wheatley, 23, Leadenhall-street; J. S. Walter, 12, Addle-street; C. Denny, East Dulwich; G. E. H. Pearce, 9, Crosby-square.

EAST LANCASHIRE MUTUAL AID ASSOCIATION (Limited).—Capital 10,000*l.*, in shares of 5*l.* The business of a property and advance company in all branches, also of financial agents. The subscribers are—W. C. Hargreaves, Burnley, 5; J. Stephenson, Burnley, 5; T. Holden, Burnley, 5; T. Riding, Padham, 5; P. E. Roberts, Burnley, 5; R. J. Roberts, Burnley, 1; J. Peters, Darwen, 5.

COAL MINES VENTILATING FAN COMPANY (Limited).—Capital 50,000*l.*, in shares of 5*l.* To manufacture, deal in, and sell all such machines, appliances, fans, engines, water-wheels, &c., as may be necessary for utilising and developing a certain patent acquired by this company. The subscribers (who take one share each) are—J. M. Stobart, Ryde; D. G. Sandeman, 15, Eddon-road; P. D. N. Oxenden, 7, Elm Park-gardens; H. Gardner, 25, Craven-terrace; C. S. de Bag, 9, Victoria Chambers; C. Robinson, 152, Malpas-road; F. L. Jeyes, 9, Victoria Chambers.

ANGLO-AMERICAN CASINGS COMPANY (Limited).—Capital 10,000*l.*, in shares of 10*l.* The business of buyers, dealers in, and sellers of sheep's casings and skins, hog's and pigs' casings and skins, and of general merchants and commission agents. The subscribers (who take one share each) are—A. Glen, 18, Springdale-road; F. C. Gooding, 76, New-street; S. Wise, 17, Mile End-road; R. Thomas,

Tottenham; C. Carter, Brixton; A. Francis, Camberwell; J. Bennett, Wandsworth.

THE SOUTHERN INLAND NAVIGATION COMPANY (Limited).—Capital 35,000*l.*, in shares of 100*l.* The usual business of a ship-owner. The subscribers (who take one share each) are—R. Thomlinson, 101, Leadenhall-street; G. Thomson, Liverpool; R. Wakeham, Liverpool; J. Thomlinson, Liverpool; J. Parkes, Liverpool; F. G. S. Eartham, Liverpool; W. Clark, Liverpool.

THE LONDON PARAFFIN, WAX, AND OIL COMPANY (Limited).—Capital 50,000*l.*, in shares of 10*l.* The manufacture of paraffin, wax, and oil, in conjunction with certain acquired patents. The subscribers (who take one share each) are—W. E. Cadman, 70, Fellows-road; J. B. Gooding, Ealing; W. Newton, 11, Mitre-court; W. Doig, 75, Marquess-road; J. K. Field, Battersea; F. Clark, 12, Warren-road; D. C. Doig, 39, Lombard-street.

THE LANCASTRIE PEAT FIRE LIGHT COMPANY (Limited).—Capital 10,000*l.*, in shares of 1*l.* To acquire and continue a business established at Queen-street, Miles Platting, Manchester. The subscribers (who take one share each) are—R. Dawson, Miles Platting; J. N. Smith, Lower Broughton; J. Smith, Manchester; T. Mayor, jun., Salford; J. Chambers, Stockport; H. L. Williams, Manchester; T. Pollitt, Manchester.

THE LANCASTRIE AND CHESHIRE BANKING COMPANY (Limited).—Capital 1,000,000*l.*, in shares of 20*l.* To acquire and carry on the businesses of the Cheshire Bank, and Manchester and Oldham Bank, or any of them. The subscribers (who take one share each) are—J. W. D. Mather, Stretford; J. L. Aspland, Dukinfield; G. W. Crabb, Willaston; T. Aldred, Manchester; W. Berry, Manchester; T. C. Mortimer, Manchester; M. E. Rae, Blackburn.

THE PALACE MANSIONS COMPANY (Limited).—Capital 40,000*l.*, in shares of 5*l.* To acquire a certain property for the purpose of erecting and maintaining thereon all kinds of buildings. The subscribers are—R. B. McCoen, Ewell, 20; W. O. Swanston, Uxbridge, 20; E. L. Ryos, 59, Warwick-road; 20; J. H. Batten, 6, Campden Hill, 1; T. Lewis, 2, Albany-court, 1; W. C. Vokes, 30, Linerstreet, 1; G. F. Pearse, 79, Hemmingford-road, 1.

THE ALBION MILL COMPANY (Limited).—Capital 20,000*l.*, in shares of 500*l.* To acquire certain mills and to carry on therewith a cotton manufacturing, weaving, and spinning business. The subscribers are—E. Sutton, Great Harwood, 2; A. Mercer, Great Harwood, 2; D. Birtwistle, Great Harwood, 1; W. Mercer, Great Harwood, 1; E. W. Riley, Great Harwood, 1; T. Brennand, Great Harwood, 1; L. Bourne, Broughton, 1.

THE BRIGHTON AND SOUTH COAST TRAMWAYS AND CARRIAGE COMPANY (Limited).—Capital 50,000*l.*, in shares of 10*l.* To construct, equip, maintain, and work tramways in and between Brighton, Rottingdean, Newhaven, and other places in Sussex. The subscribers (who take one share each) are—J. Bennett, Barnsby; E. Toovey, 28, St. Swithin's-lane; J. W. Ellis, 55, Chancery-lane; J. T. Chead, 34, Union-street; A. Wilkee, Whitechapel; W. H. Sargeant, 28, Budge-row; T. Chatterton, 38, Linden-grove.

CHURCH COLONIAL LAND SOCIETY (Limited).—Capital 250,000*l.*, in shares of 10*l.* To acquire any lands and other real and personal property abroad, and to carry on a general colonisation, agricultural, financial, and commercial business in connection therewith. The subscribers (who take one share each) are—R. G. Allen, Liverpool; J. Bridges, Liverpool; J. C. Sharpe, 19, Fleet-street; A. B. Stoney, 6, Stone Buildings; C. E. R. Campfield, Battle; H. Fowler, West Dulwich; E. C. Wicks, 50, Mervan-road.

THE HULL AND EAST COASTROPERY AND SHIP CHANDLERY COMPANY (Limited).—Capital 10,000*l.*, in shares of 10*l.* To acquire and carry on at Great Grimsby a business of ship chandlers, store dealers, provision merchants, &c. The subscribers (who take one share each) are—C. H. Huss, Great Grimsby; S. Willsea, Great Grimsby; J. R. Westerman, Hull; J. A. Towney, Hull; H. Gray, Hull; J. G. Krause, Great Grimsby; T. Moore, Hull.

DICIDO PIER COMPANY (Limited).—Capital 30,000*l.*, in shares of 50*l.* To construct, lay down, and maintain a pier or piers, wharf or wharves, warehouses, &c., in the province of Santander, Spain. The subscribers (who take one share each) are—A. Edwards, 5, Newman's-court; A. W. Edwards, 5, Newman's-court; W. Carter, jun., 5, Fenchurch-street; F. Tate, 5, Fenchurch-street; T. P. Roy, 5, Fenchurch-street; H. H. Witty, Billiter House; R. C. Wyatt, Billiter House.

THE MUNICH ICE COMPANY (Limited).—Capital 50,000*l.*, in shares of 1*l.* The manufacture and supply of ice. The subscribers (who take one share each) are—J. P. Leith, 8, Dorset-square; J. C. Thynne, 'The Cloisters'; W. W. R. Burgess, 13, Weston-road; H. J. Bass, 13, Henrietta-street; A. Mason, 16, Barnard-street; F. Buchanan, Ilford; W. Billington, Bow.

THE WHITEHAVEN UNITED GAS COMPANY (Limited).—Capital 60,000*l.*, in shares of 10*l.* To acquire and undertake the whole of the property and liabilities of the Whitehaven Gas Light Company (Limited).—The subscribers (who take one share each) are—J. Hodgson, Whitehaven; J. H. Robinson, Whitehaven; H. Kenyon, Carlisle; W. Hodgson, Whitehaven; J. Robinson, Whitehaven; A. Helder, Whitehaven; J. Porter, Whitehaven.

THE HUNGARIAN GREAT SOUTHERN RAILWAY COMPANY (Limited).—Capital 400,000*l.*, in shares of 20*l.* To acquire a concession, lay down, equip, maintain, and work a system of railways in the said country. The subscribers are—D. D. Pontifex, Devonshire Club, 100; G. B. Malleson, 27, West Cornwall-road, 50; J. McMillan, 5, Paper Buildings, 25; H. S. Neild, Wimbledon, 25; C. Nicholson, 8, Laurence Pountney Hill, 10; G. N. R. Goddard, 16, Regent-street, 25; E. H. Pollard, Temple, 25.

THE CITY OF LIVERPOOL SUBURBAN OMNIBUS AND CARRIAGE COMPANY (Limited).—Capital 150,000*l.*, in shares of 1*l.* To establish and carry on a local business of omnibus and cab proprietors, carriers, agents, &c. The subscribers (who take one share each) are—E. Grindley, Liverpool; R. W. Pallien, Liverpool; S. L. Gregson, Liverpool; T. H. Sheen, Liskeard; T. Morris, Liverpool; J. B. Morgan, Liverpool; J. Ruddin, Liverpool; W. H. Blain, Liverpool.

WEST KIRBY "MONT DORE" (Limited).—Capital 100,000*l.*, in shares of 5*l.* To erect and maintain hotel and bathing establishments, with all necessary conveniences, &c. The subscribers (who take 20 shares each) are—P. M. Braidwood, Birkenhead; J. H. Dawes, Trentholme; D. Hollins, Stoke-upon-Trent; J. H. Montresor, 8, Austin Friars; D. G. Sandeman, 15, Eddon-road; E. J. W. Stratford, West Malling; L. S. Forbes, 14, Cavendish-square.

CONSOLIDATED LAND AND CATTLE COMPANY (Limited).—Capital 750,000*l.*, in shares of 5*l.* To purchase or otherwise acquire, settle, improve, and cultivate lands, franchises, and hereditaments in the United States or elsewhere. The subscribers (who take one share each) are—Lord Thurloe, 33, Chesham-place; C. G. Pocklington, Woburn; H. R. Lewis, Bartholomew House; E. W. B. Loving, Langham Hotel; J. McCulloch, Stranraer; G. W. F. Robinson, 15, St. Paul's-road; A. Fletcher, 1, George street.

THE TRANSVAAL INVESTMENT AND GOLD COMPANY (Limited).—Capital 300,000*l.*, in shares of 1*l.* To purchase and otherwise acquire, settle, improve, develop, and cultivate properties, lands, and hereditaments in the Transvaal Republic, and elsewhere in South Africa, and in particular with a view thereto to adopt and carry into effect an agreement entered into. To develop the resources of any acquisitions made by the company, and to stock, breed, and deal in all kinds of stock, cattle, sheep, and produce, and carry on all operations connected with and incidental to all kinds of mining, whether for gold, precious stones, &c. The subscribers (who take one share each) are—G. S. Logie, 2, New-street, accountant; R. W. Brown, Walthamstow, accountant; G. C. Harvey, Anerley, gentleman; E. B. Kidder, 91, Finsbury Pavement, solicitor; A. J. Robins, Rotherhithe, clerk; A. Wilkin, Gravesend, gentleman; E. Schubert, 32, St. Swithin's-lane, accountant. The majorit of subscribers to the Articles of Association will name the first directors, whose numbers must at no time be less than five or exceed nine.

THE MINERAL ASPHALTE COMPANY (Limited).—Capital 50,000*l.*, in shares of 5*l.* To manufacture, lay down, and sell asphalt of all descriptions and to acquire the full benefits of "Tottrell's Imperishable Asphalt." The subscribers (who take 40 shares each) are—R. J. Jenkins, 16, King William-street; E. Rawlings, 3, Victoria-street; J. H. Brass, Chelsea; H. Alcock, 128, Bishopsgate-street; H. E. Wallis, 9, Bridge-street; F. Newton, 16, King William-street; J. Norton, 24, Old Broad-street.

Greetings of Public Companies.

UNITED MEXICAN MINING COMPANY.

A general meeting of shareholders was held at the Guildhall Tavern, on Monday,

Mr. GEO. HARRIS in the chair.

Mr. W. M. BROWNE (the secretary) read the notice convening the meeting, and the several special resolutions passed at the meeting on March 3 were submitted and unanimously confirmed—"That clause 6 of the company's Articles of Association be altered by omitting therefrom the words 'There shall not be a division of any share of 30*l.* into subdivided parts.' " "That the Articles of Association be altered by the addition thereto of the following regulation (to be called Article 6a):—"The company may subdivide shares in the manner and with the incidents prescribed or allowed by the Companies Act, 1867, and may modify the conditions contained in the Memorandum of Association accordingly." And—"That out of the accumulated undivided profits of the company the sum of 2*3*d. per share be returned to the shareholders holding shares of 30*l.* each with 2*9*, 1*2*, 8*3*d. paid up thereon, in reduction of the amount unpaid on the said shares respectively, and that the amount unpaid on each share be accordingly increased by the like amount of 2*3*d. per share."

The CHAIRMAN: Gentlemen, that concludes the whole of the first part of the meeting, and now an extraordinary meeting will be held for the purpose of passing these further resolutions, which are consequent on the first resolutions which we have just confirmed, and which we could not pass until those resolutions had been confirmed. We are now in a legal position to consider these second resolutions.—Mr. MILES BURKE said he would like to ask a question with regard to the third resolution, which had just been confirmed. They seemed to deduct a small amount from the 2*3*d. and then to add it on again.—The CHAIRMAN: The shares are now 2*9*, 1*2*, 8*3*d. It is paid up, and if you deduct 2*3*d. from it you make the shares 2*6*, 1*2*, 6*3*d. which is divisible by three, so that your liability will be 2*6*, 1*2*, 6*3*d. per share on each share. It does not increase your liability, but you get the money in your pocket. It is a return.

Mr. SMITH (a solicitor): You do not return to the shareholders the amount unpaid on each share. The amount unpaid on each share is increased, but it is not recalled. The 2*3*d. per share is only returned for the arithmetical object of dividing without a decimal fraction. It was resolved, upon the proposition of the CHAIRMAN, seconded by Mr. CRABB—"That each of the existing shares of 30*l.* each be subdivided into three shares of 10*l.* each, and that the conditions contained in the Memorandum of Association be modified accordingly: Provided that in such subdivision the proportion between the amount which is paid and the amount which is unpaid on each share of 10*l.* each, shall be the same as in the case of the existing share of 30*l.* from which it is derived, and, consequently, that each existing share of 30*l.* having 2*3*d., 2*9*, 1*2*, 8*3*d. paid up thereon, shall be represented by three shares of 10*l.* each, having 9*l.*, 2*9*, 6*3*d. per share paid up thereon; and so in like proportion, in cases where any greater or less amount than 2*3*d., 2*9*, 1*2*, 6*3*d. is paid up on any existing share."

The CHAIRMAN then moved—"That the directors may issue and dispose of three shares of 10*l.* each, having 9*l.*, 7*5*, 6*3*d. per share paid up thereon, in lieu of each or any of the 32*l*

gram, the actual excess over outlay was \$5743. The end of our audit had entered our mine of El Diamante, from which the late Mr. Furber always expressed many hopes of having a large amount of ore. That is the last mine we had. The lode there, the report says, is 2-20 metres wide, which is all in fair ore. The other points of the mine are looking remarkably well.

A SHAREHOLDER: How deep is the mine El Diamante above it?—The CHAIRMAN: Not very deep.—The SHAREHOLDER: That was in ore?—The CHAIRMAN: Yes; Mr. Furber worked it himself. We have a very large tract of land between the adit and the depth at which they worked the shaft. Then the report goes on to say that the quantity of ore was in excess, and that the ore taken out was of better quality. But the most cheering point of all is that we have received a letter from Mr. Rocha, dated Guanajuato, Feb. 19, which I will ask Mr. Browne to read:—

"The news the directors give you of the rumours afloat in London about the mine of San Cayetano have astonished me. These rumours are intended to make believe that the reserves or pillars I have spoken of in my last reports do not exist. You can, therefore, assure the directors that the reserves do exist, and that, in my opinion, they are so important that I have not the slightest doubt but that they are worth more than all the ore extracted from the workings of the mine during last year. I take due note of the wishes of the directors regarding cross-outs, and in a short time we will begin this work at the most promising points."

The CHAIRMAN: That is a very important letter.—Mr. MORRISON: I can confirm that by further evidence I have had from the spot, to the effect that the reserves are worth \$500,000.

The proceedings terminated with the usual complimentary vote.

GOLD COAST MINING COMPANY.

An adjourned ordinary general meeting of shareholders was held at the Guildhall Tavern on Tuesday, for the purpose of further considering and adopting the accounts of the company,

Mr. H. W. MAYNARD in the chair.

Mr. BROMHAM (the secretary) read the notice convening the meeting.

The CHAIRMAN said that, as they were aware, the meeting resolved itself into two distinct parts—the first, as far as he was himself concerned, being of a mere formal nature, and the second special, at which he would have a few words to say to them. The first was that the adjourned ordinary general meeting was held to pass and, if approved, adopt the accounts of the company. As to the accounts, should any of them have any further questions to ask about them, there were those present who could answer them better than he could. He would shortly explain his position as a very recent comer into that concern: but he understood from the secretary that the sole reason for the accounts not having been passed before was that certain figures were wanted. They had now been found, and the accounts were now properly signed by Mr. Thomas Ford; consequently, unless they had some further remarks they wished to make upon the accounts—and he presumed they had been inspected, and looked at, and talked about on a former occasion—unless they had any further remarks to make, he presumed they might take the accounts as passed. Would somebody second the passing of the accounts as they were?—Mr. VANS AGNEW seconded the motion, which was carried unanimously.

SPECIAL MEETING.

The SECRETARY then read the notice convening the special meeting.

The CHAIRMAN said that it became his duty to address them in a position that required their kind indulgence. He was by no means going to assume the position of the saviour of the company, and he felt it his duty to say that whatever might be the peculiar circumstances and difficulties under which the former board had laboured, individually they had done their best, and the thanks of the company were due to them for what they had done collectively, but there were some differences of opinion that he need not touch upon, and in consequence of that a committee had been appointed. Some members of the board left, others resigned, and others had been put in by the shareholders, and they very kindly came forward and asked him—he hardly knew upon what ground—to take the position which he held, and he appreciated the honour. He presumed that it was because he had some little experience in companies and some connection with the West Coast. He had, however, been more connected with the southern portion of Africa as a director of the Union Company, and he had a very large interest in all matters connected with the country, and when he had been asked by his friends Messrs. Nixon and Gunn to join the board he could not refuse; and so, for better or worse, he was there. His own impression was—that the thing was in a nutshell—that money was needed, and that if it was intended to carry on the company money must be had. The question was how to raise the money for the moment. He thought the circular which he had issued was such as would have tempted out of their pockets sufficient money to carry on the company. In the circular he issued he had proposed a minimum and a maximum—the maximum, and what they wanted, was 10,000 shares of £1 each. The minimum, and that had not been reached, was 4000£, and unless that 4000£, were approximately arrived at he did not see—he was quite open to hear any suggestions the shareholders or directors might wish to make—but he did not see how it was possible to go on with the company, which must, therefore, be shut up. Some of the shareholders had suggested that they should sell the company, but he did not think that they would get anything for it in its present state; he thought the best thing they could do was to do all they could to influence others to take a larger number of shares. The first point he should touch upon was as to how poor they had got. On that subject many shareholders had called upon the secretary, and had written to him to know in what position they then were. He might tell them that they began with applications for 300 shares on each of the first two days. At that time he said that it was hopeful, and that it would increase as time went on, and in 10 days or so it would produce 4000 shares. That had, however, unfortunately not turned out to be the case. The total was now 1579 shares applied for. One of their creditors had generously, and he should quote it to his credit, accepted 600 shares, provided, he presumed, the scheme was carried through, in preference shares for his debt. That added to the 1579 shares gave 2179 shares or pounds, and which was not much more than one-half at what he certainly thought the minimum with which they could continue in justice to those who came forward to help them to carry on the company. When he looked at the list of shareholders he thought it was a very admirable list. His experience was that small shareholders did not subscribe, and if he had found that the average holdings in the company was only 50 shares, he should have given it up as hopeless, because when a man subscribed 50, he would not care about sending any chance money after the 50£, but if he subscribed 300£, or 400£, he thought there was a prospect of his venturing some more to get back something of what he had paid in; and therefore, looking at the share list, he certainly hoped that the money would have come forward, but it had not. Some of the shareholders had written stating their perfect inability to subscribe for any more preference shares, but he was afraid that there was a feeling that 10 per cent. preference was not enough. It seemed to him that unless something could be done at this meeting they would have nothing more to do but to wind up and reconstruct the company, and he need not say that would be to the ordinary shareholders a very disadvantageous course for them to pursue, as it would cut down the present value of the ordinary shares immensely; but he could not see how they were going to meet the position otherwise. As to the liabilities of the company, they amounted to £260. With a company whose shares had been at a premium, and whose manager had paid his way with the gold found out there, and was now willing to continue to pay his way, as he understood, without drawing out of the company at home, and had remitted some 3000£ to England besides, it seemed to him an extraordinary position. They had a property which was by far the cheapest property out on the West Coast of Africa. They had 4000 yards frontage, that now came out at a cost of 21,750£, and their total liabilities were only 1260£, the total application for shares being 2179. Thus they would see there was very little left—800£, or 900£—over for machinery and for other things. Was it worth while for them to go on with that amount, and would those who had subscribed be willing to do so at so small an amount? This would remain to decide. As to their assets, there were some shares that had been forfeited. From Mr. Fitzgerald's estate there were 4678 shares, and there was 1311£ due on them. These had been put down as an asset at 4£ per share, and that would give 554£. There was a paragraph in his circular that might have led to a misunderstanding. It was that Mr. Houghton had reported that 70,000£ worth of ore could be won from the mine. That should properly have read that there was 70,000£ worth of ore in sight, and if he had seen that statement before the circular had been sent out he would not have permitted it to have gone out in that way. Whatever was past was past; but there were great mistakes in judgment in refusing to sell a portion of the property when they had an opportunity. If they had only had that 10,000£, in cash and 10,000£ in shares, if they had been promptly dealt with, the company would now have been in an exceedingly good position. But instead of selling what they had bought, Mr. Houghton had reported upon the property that he had ever seen. Before putting the resolution to the meeting he thought there had better be some conversation as to the matter, for the position was a very serious one. He would, therefore, invite discussion before moving the adoption of the resolutions.

Captain MOLESWORTH, R.N., thought there must be some uncertainty in the shareholders' minds to account for the fact that they had not come forward so well. The most important thing they had to look to was the return of Mr. Houghton to this country, as, he believed, he could establish his reputation as a first-class engineer, and it would be upon his opinion he thought, that the board would wish to act. But, as the Chairman had suggested, it was a great misfortune that, with the 70,000£ worth of ore they had in sight and with the gold he believed their manager had at present, that they could not get the money to go on with. He had every reason to believe that the manager had sufficient gold, and could get sufficient gold, to keep the mine going. If they could only get sufficient money just to bridge over this time it would be good for the company. Once get gold and their shares would rise, and they had 6000 or 7000 shares which they could sell perhaps at par, but certainly at a better price than they were at the present moment. The company had only spent in machinery 5224£, whereas in stores and wages they had spent about 13,000£; and the result of the expenditure had been to bring in sight 70,000£ worth of ore. Surely no company could be in a better position than they were. All they wanted was to get this money. He believed there was an immense success for the company in the future. The stamping machinery and mills were in order, and were worth about 5000£. It was admitted out at the Coast that 60 per cent. of the staff had gone to the mining, and yet they got an ounce to the ton. Mr. Houghton stated that he had never seen anything like the gold he had got, and he certainly went out very much prejudiced against the mine.

The SECRETARY, after some further discussion, said that several shareholders had written to him suggesting that bonus shares should be issued with the pre-ference shares.

A SHAREHOLDER thought that was a very good idea.—Some further discussion ensued, after which

The CHAIRMAN said what the board proposed to do was this. There were 3000 ordinary shares unissued, and they proposed taking those shares as far as they

went, and probably up to 2000, and issuing one share for every two preference shares applied for. Those shares would be fully paid up.

The following resolutions were then, on the motion of Mr. PITMAN, seconded by Mr. CLARKE, carried unanimously:—

1.—That the capital of the company be increased to 80,000£ by the creation of 10,000 new shares of £1 each.

2.—That the new shares be called preference shares, and that the holders thereof be entitled to be paid a cumulative preferential dividend at the rate of 10 per cent., and that the surplus profits, after payment of such preferential dividend, be applied in payment of a dividend of 10 per cent. upon the ordinary shares of the company for the year in which the application is made, and subject thereto be divided rateably between the holders of the ordinary and the preference shares of the company, in proportion to the amounts paid up on their shares respectively, and that one ordinary fully paid share be issued for every two preference shares applied for, in addition to the 10 per cent. dividend.

3.—That after the holders of the preference shares of the company shall have received dividends amounting in the aggregate to 100 per cent. their right to a preference dividend shall thenceforth cease, and the preference shares shall have only the same rights in respect of dividends as the ordinary shares.

The proceedings closed with a vote of thanks to the Chairman.

LISBON-BERLYN (TRANSVAAL) GOLD FIELDS COMPANY.

The statutory meeting of shareholders was held at the Cannon-street Hotel on Saturday, March 22,

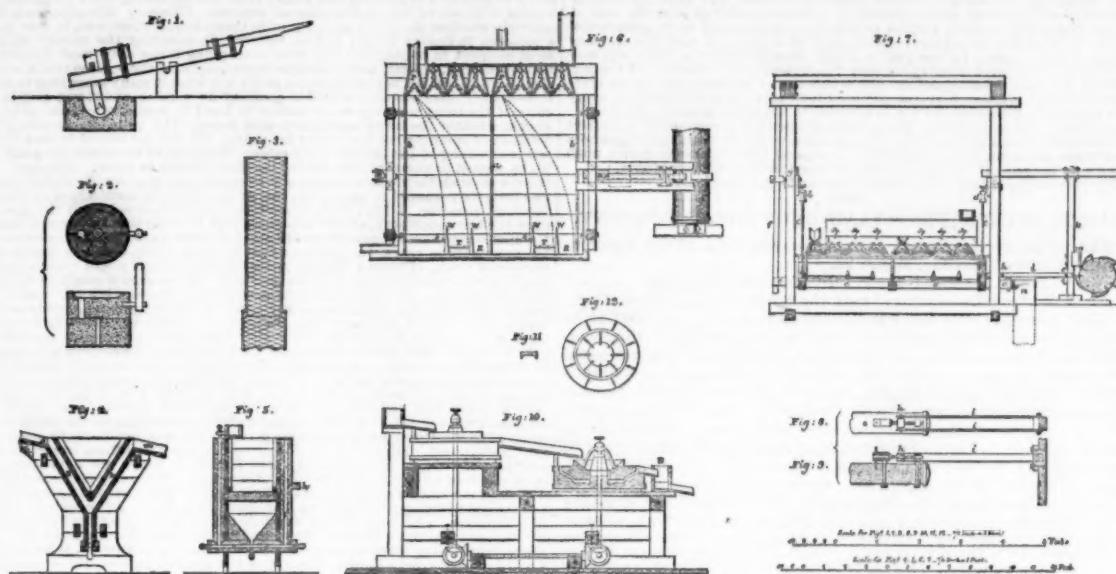
Baron ALBERT GRANT, the Chairman, presiding.

Mr. J. DAVIS (the secretary) read the notice calling the meeting.

The CHAIRMAN said this was the statutory meeting provided to be held by the Limited Liability Act within four months of the incorporation of the company. At a meeting of this kind it was not usual to present a report or accounts, and in this company, probably, a report was less needed than in many which were formed, because the shareholders had been so well posted with regard to the progress of the company that, practically, they knew really almost all he could tell them. They were aware that this company was registered at the end of December, and the allotment took place about Christmas. This was March 22. About three months from the time of formation had, therefore, elapsed since the shares of the company were allotted. Therefore, another month might have been allowed to elapse before the calling of the present meeting; but as several shareholders had enquired when the meeting was to be held, the directors thought it better to hold it as soon as possible, so as to let the shareholders know, by word of mouth, a confirmation of the various circulars which the directors had sent round from time to time. They would have seen, of course, that the progress of the company had been unusually rapid for any sort of company, but especially for a mining company. Of course, when a mining property was purchased there was always an immense deal to do before it could be put into condition to return profits and pay dividends. This applied to a mine at home in England, or near England; but especially so to a mine such as this, situated in Africa, about 8000 miles away, and it applied even more to this property in consequence of its being a gold mining property, whose formation, as far as could be ascertained, more or less differed from most gold mining formations known in California and Australia, and consequently a great deal of information had to be obtained. The directors had avoided what he could not help thinking had been the mistake of other companies formed to work mines in the Transvaal—not ordering the necessary machinery adaptable to the country and the property to be worked. His own impression was that although this company was started about 18 months after a company which he might call the pioneer company there, yet he believed that if nothing occurred—which he did not see likely to occur—the Lisbon-Berlyn would be at least a year ahead of that company, although it had been formed about 18 months earlier. (Cheers.) He did not say this in any spirit of boastfulness; but in order to let the shareholders know that in the three months that the Lisbon-Berlyn had been at work the directors were able to be in a position to announce, as he now did, that the whole of the hydraulic machinery, and the 60-stamp mill and the other apparatus necessary for working the alluvial and quartz deposits, had come over from California, and was on board a vessel which was going out of the Thames that very moment. (Hear, hear.) He, therefore, thought the directors might fairly take credit for not having wasted time. The machinery which had been sent out was the very best which could be obtained from an extended experience, and also upon economical terms. The directors had received letters from manufacturers and friends of manufacturers of mining machinery in England, asking why we had not ordered the machinery in this country? Well, when he took in hand that part of the business he made up his mind that it was necessary to throw aside any influence but that which would tend to the benefit of the company in the way of getting the best machinery and improvements practicable, and above all the most experienced advice, because in mining, especially in the machinery, theories were of no use. A person might be the most able theoretical person possible, but he was no use unless he had had practical experience. There were contingencies peculiar to each mine, which were not reproduced in other mines, and which could only be dealt with by a person of practical experience. Therefore, he applied to Prof. Price, of San Francisco, for his advice regarding the kind of machinery which ought to be ordered to work this great property in South Africa. He need scarcely say that to anyone who knew anything about mining, the name of Prof. Price would be a guarantee that the ablest knowledge on the subject, as well as the most straightforward conduct in any negotiations entrusted to him, would be represented in his person. He believed it had been said by Americans that anything which Prof. Price wrote, or anything which he said, might be implicitly confided in, and those who knew anything about mining were aware that this was not always the case with every American expert. But Prof. Price was an exception; he was a man of vast experience, and a perfect representative of straightforwardness and honesty; and, therefore, he had no hesitation in asking his colleagues to confide in Prof. Price as to the character of the machinery and the manufacturers who should be entrusted to make it. As they knew San Francisco was 22 or 24 days by post from London, and if the directors had always communicated with Prof. Price by post they would at the present moment have been about in a position to inform the shareholders that the machinery was just ordered, instead of being able, as they were able, to state that the machinery was not only manufactured but was actually shipped to Durban *en route* to the gold fields. This had been achieved by a very free use of the cable; so that what was impossible before the cable was laid was perfectly possible now. Still if the order for the machinery had been given on the very day that the company was started it could not have advanced so far as it had, because there was a certain physical time necessary to manufacture a 30-stamp mill and other necessary apparatus, although it was perfectly true the Americans worked enormously fast, and in that way could give many lessons to our manufacturers. He supposed the absence of Trades Unions had something to do with this, and that it was a mere matter of pay. At any rate the American manufacturers worked at a rate which shamed many of the large manufacturers in England. Knowing that the capital, or at all events a sufficient portion of it, would be subscribed to warrant them going on he opened negotiations through Prof. Price before they had actually got the capital. It was a risk he took upon himself personally, but it was a benefit now to the company, because it had saved time, and time, according to an old English saying, was money, and because the sooner they got to work the sooner he hoped they would be able to send bullion home. (Hear, hear.) In addition to this there was the important fact to be borne in mind that for the next three or four weeks the machinery would be able to be got up to the gold fields from Durban, but if it were delayed beyond that time it could not be done, because the winter season would set in at Durban, and there would be practically three or four months' delay in getting across the Veldt up to Lydenburg and then up to the mines. Therefore, by ordering the machinery at the time he did they had saved three or four months, and they had also effected great economy in the cost of transit. At a recent meeting it was stated that another company had paid 26. per ton for the transit of goods from Durban to Lydenburg, and another company 22. per ton. In this company the directors had been fortunate enough to get out their machinery and goods at 15. per ton, the goods which were being sent now, as it was getting near winter, would be charged 16. 10c. per ton, but if they had waited longer the charge would probably be from 25. to 28. per ton. The wagons had to be drawn by 16 oxen, and the transit from Durban took from 32 to 40 days, according as there might be more or less delay on the road. The saving effected was important, because they had to send up about 6000 tons of goods, and a saving of 10c. per ton represented 6000£. (Cheers.) Well, it was easy to say they had ordered a 60-stamp mill, and also hydraulic apparatus, and that there was an end of it; but the shareholders could scarcely be aware of the enormous labour involved in ordinary machinery of this large and expensive character, and he thought that in regard to machinery, at any rate, the shareholders would say that the directors had done their duty, and had not wasted time, when he was able to tell them that with the exception of some quicksilver, which would leave next week, the whole machinery necessary to work the alluvial deposits and the quartz reefs, would have left England by the end of next week. (Cheers.) So much with regard to the machinery, and he would dismiss that subject by saying that he believed it would prove thoroughly capable of doing the work it had to perform. Everything had been sent out, and it would be found by the result that the money that had been spent and the time that had been given, and the conversations he had had with experts, would bear comparison with what had been done in any other mine as far as the machinery was concerned. But machinery without proper persons to wield it would be of very little use. In that again he thought the directors had done wisely in going to California, which was essentially the home of gold mining, for their mining staff. The directors made up their minds that as it was American machinery which had to be worked it was best to have American experts to work it, because then the staff could not say that they had machinery to which they were not accustomed. Therefore, the directors decided that American experts were the proper persons to work the mine. The board had asked Professor Price to look out for the ablest and most straightforward man in California to take the management of this concern. Professor Price set to work, and after some time cabled to the directors that he had engaged Mr. Gould, who was stated in the prospectus as the mining engineer-in-chief, and he engaged as second in command a gentleman named Crittenden, and Professor Price wrote that he did not know which to give the preference to out of those two gentlemen—but Mr. Crittenden knew more about hydraulic mining than quartz rock, and Mr. Gould more about quartz rock than hydraulic mining. At the last moment Mr. Gould was induced not to leave home, and, therefore, Mr. Crittenden was engaged as engineer-in-chief, and Professor Price wrote that the company was to be congratulated by giving Mr. Crittenden that position. Mr. Crittenden and Mr. Macleachan, the second in command, came over to London with the other men; and he must say, from a long experience of men and things, that he was extremely pleased with the gentlemen who had been sent over *en route* to the gold fields. This opinion was confirmed by an independent gentleman who knew Mr. Crittenden, who stated that there was not a more able, or experienced, or straightforward man in California. (Cheers.) Mr. Crittenden whilst in this country was engaged for a fortnight or three weeks in ordering the necessary supplementary stores and various things which could be bought more economically here than in San Francisco; finally Mr. Crittenden and his party left for South Africa, and landed either yesterday

or to-day at Durban, and in a week or ten days, or certainly a fortnight, would be at the gold fields; and he hoped that within a month from now the directors would receive a preliminary telegram giving Mr. Crittenden's opinion as to what he thought of the gold fields he had gone out to work. The directors engaged the staff and sent out the machinery on the footing that they had very rich and very extensive gold fields to work, and they thought it was real economy in spending the money fast rather than taking a long time to spend it merely in directors' fees, and having no returns. (Cheers.) His object was to ascertain whether there was a paying mine there, and, if there was, to lose not a moment in finding it out; and he believed, in spending the money which must be spent in finding this out, that in spending it fast they were spending it economically. (Hear, hear.) People repeatedly held the opinion that a mine should not be worked beyond a certain point; but what it really amounted to was this—that if there was only a limited quantity in a mine, and it was sold as a mine, if the thing were vigorously taken in hand it would, of course, be seen at once whether the thing was a sham and fraud. The principle occasionally obtained of spinning out the money for years. He did not intend to lend himself to anything of the kind in this mine. What there was there, for good or ill, he wanted to know, and he wanted the shareholders to know. (Cheers.) If there was much they wanted to know it as quickly as they could; and if there was little they wanted to know that, too, so as not to be humbugged by being in a fool's paradise. (Hear, hear.) Therefore, the directors had spent the money upon the best machinery, and an expensive staff, in order that they might work the mine upon the ablest possible practicable scale, and if they had large dividends for two or three years, he preferred that to small dividends over double the number of years. (Cheers.) Consequently the shareholders might count upon that this mine would be worked with quickness. He believed it would be worked during their time and during their children's time. There were vast resources there. The property comprised 20,000 acres of alluvial ground, which would take a great many more years than he cared to prophecy, not only to work them out, but even to make an impression upon them, unless they were altogether deceived and under a falsehood. They had seen extracts from the reports of the mining men who had been out. They had the testimony of Mr. Owen, one of the vendors, who had lived 20 years in Natal, who, in an interview with a representative of the Natal Witte s, of Feb. 20, stated that it had the advantage of being well watered, and from its auriferous qualities was worth 25 millions sterling. Of course, he did not endorse all the statements which were made; but Mr. Owen was a very shrewd man, and was not likely to make an idiotic statement. (Hear, hear.) At any rate, it meant that there was an infinite quantity of gold in the property, and Mr. Owen would not have ventured on such a statement unless he believed there was an unusually large amount of wealth in the field in question. He believed Mr. Owen had good grounds for believing it to be a good mine, and had good grounds for so believing. Then Mr. Hamilton, who went out to examine the property, mentioned it as being worth many millions. But apart from professional men, the directors had had letters from two or three of the staff who were staying at Durban, shipping the first lot of goods up to the gold fields, and the general opinion there was that these fields are of enormous richness. Having referred to other independent testimony to the value of the property, he said that, of course, these reports would sink into comparative insignificance when compared with the reports which would shortly be received from the company's own people, who had been sent out to prospect and work the property, and certainly he, his colleagues, and everyone connected with the company would be very much disappointed if it did not turn out a very rich mine indeed. (Cheers.) He believed the Transvaal, as a whole, when they got proper machinery out there, and proper organisation, would return an amount of gold which would only compare with California, and some people thought it would go still further. The shareholders would be glad to know when they might expect the first shipment of gold home. (Hear, hear.) As far as he could make out, if all went well, and there was no unusual accident, which he could not foresee, he thought they might look forward at the end of July or the beginning of August to get a telegram telling about the first gold. (Cheers.) At that time the company would have been established six months, with a property many thousands of miles away, and if they did this they would not have done badly. As regards ways and means, the shareholders might like to know how they stood. With respect to capital account, when they launched the prospectus they wanted to place 150,000£; but owing partly to the distrust of all gold mining operations and the failure of Indian gold mines, suspicion was engendered in the minds of investors, and partly through the Transvaal being in disfavour, and on account of political grounds, public favour had not arrived at that pitch to give its entire confidence to mines in the Transvaal turning out a success. From what he had seen of the Boer people, through the deputation who had visited this country, he was bound to say they seemed to have a mind to do what was right, and to keep their engagements to this country, and especially to keep their engagements to the concessionaires of this gold field. He wrote to the President, when in this country, asking whether he would write a letter to say if he would be glad to see the gold fields actively developed; and the President wrote a reply, which was published in the papers, stating that he would be too glad to see the gold fields developed and the place populated to the fullest possible extent, and it was natural he should wish it, because they got 2½ per cent. royalty. He was convinced that those people meant to act fairly to the company, and also see that the engagement made with the concessionaires were rigidly kept. About the same time

MINING AND THE TREATMENT OF GOLD ORES IN THE NORTH OF JAPAN.



MINING AND THE TREATMENT OF GOLD ORES IN THE NORTH OF JAPAN.

BY ROBERT JAMES FRECHEVILLE, ASSOC. M. INST. C.E., H.M. INSPECTOR OF MINES FOR CORNWALL AND DEVON.

In the northern part of Hondo, the largest of the Japanese Islands, about midway between the eastern and western seaboard, and some 60 miles to the south of Awomori Bay, are situated the Okudzu Mines, where a number of small veins enclosed in a porphyritic rock have been worked for gold from time immemorial. (This memoir is published in the Other Selected Papers, edited by Mr. JAMES FORREST, the secretary of the Institution of Civil Engineers, by permission of the Council). These veins vary in width from 2 in. or 3 in. to as many feet, the average width being about 1 ft., and are filled with quartz and decomposed country rock carrying disseminated crystals, and thin bands of copper and iron pyrites, together with small quantities of zinc blende and galena. The gold contained, which is in such a finely divided state that without pulverising and washing the ore it can scarcely ever be detected in the richest specimens, even with the aid of a magnifying glass, ranges from a mere trace up to several ounces per ton. The richest classes of ore also often have telluride of gold associated with them.

The district being mountainous has enabled these veins to be worked by means of adit levels to a depth of about 120 fathoms below their outcrop. In driving these adits, the deepest of which has a length of over 1400 fathoms, advantage has been taken of a soft clay cross-course, which intersects the lodes, and has heaved them 40 or 50 fathoms; close to this cross-course the lodes were most productive, and have been extensively mined, whilst some little distance off they decreased in size, and became hard and poor. The miners worked both on tribute and tutwork by single-handed drilling with powder as an explosive; safety fuse was also used; the holes bored were about 1 in. in diameter, and 14 in. in depth; light was furnished by torches made of dried bamboo twigs; all the ore raised was carried to the surface in straw bags by women and girls; and was transported in like manner from the mine to the dressing-floors, situated in a valley about $1\frac{1}{2}$ miles distant on the banks of a small river. The miners earned an equivalent of about 1s. per day, and the ore carriers from 4d. to 6d. per day. About 120 tons of ore of an average grade of $1\frac{1}{2}$ oz. of gold per ton were produced per month, at a cost of about 4*l.* per ton delivered at the floors, the high price being due to the scarcity of this ore remaining above the level of the deep adit, the narrowness of the veins, and the difficulties of underground transportation, caused by the great length of the levels and travelling roads, and their small size, it being just possible in many places to crawl through and no more. A considerable quantity of ore of a grade of about $\frac{1}{2}$ oz. of gold per ton still remained in the mine, but owing to the wretched manner in which it was opened out could not be removed at a profit.

The richest ore was treated by the Japanese gold-washing process, which was entirely carried out by women. The ore was first pounded under stamps resembling a tilt-hammer (Fig. 1), the stamp-head being affixed to the short arm of a lever, while the motive power was given by the foot to the long arm; the coffer consisted of a block of hard stone hollowed out in the centre. When reduced to a coarse powder, the ore was ground together with water under flat stones similar to the ordinary flour-mill, but rotated by the hand (Fig. 2). The sands and slimes produced flowed by means of a spout into a little bowl placed at the head of an inclined plane about 12 ft. long formed of three scored boards, each 4 ft. long, and 1 ft. wide, set at an angle of 12° . These scored boards (Fig. 3) were made by taking a smoothly-planed plank, and marking it with a saw, which was held inclined towards the head of the board at an angle of 60° from the horizontal. The saw-cuts were 1 in. apart and 1-12th in. deep. An additional supply of water flowed into the bowl at the head of the inclined plane, the diluted material passed over the boards, the heavier particles remained in the furrows or saw-cuts, and were removed by washing and knocking the boards in a tank of water; the sands and slimes escaping from the ends of the boards fell into a tub, which retained the coarser portion, whilst the slimes flowed over the edge into the pits, from which they were occasionally shovelled out and re-washed. The coarser sands caught in the tub were reground. By this means from 50 to 60 per cent. of the ore treated was changed into slimes. The concentrations from the boards were washed out by hand in a slightly concave wooden dish, about 18 in. square. The gold obtained was melted with borax and lead, and the product cupelled. The rich residues from the hand-washing were reground, and again subjected to concentration on the boards. As can readily be imagined, in spite of the cheap labour, the women receiving only about 3*d.* (5 sen Japanese) per day, the process was an expensive one, and very limited as to the amount of mineral treated. About 10 tons per month were pulverised and washed as described at a cost of 2*l.* per ton. The results obtained varied according to the grade of the ore, about 50 per cent. of the gold being got by the first washing from ores of 2 ozs. per ton, and about 80 per cent. from the richest class of ores, which assayed at the rate of 5 ozs. per ton and upwards. The tailings, after being exposed for some time to the action of the atmosphere, were re-washed, yielding a further amount of gold. From the above it is apparent that in these mines only the richer classes of ores could be mined and washed by the Japanese processes at a profit.

In order to increase the output of the mines, and enable the poorer classes of ores to be utilized, the Japanese Government ordered a 10-stamp gold-mill from San Francisco. This was erected by an American engineer, who unfortunately died just as the works were completed; the author was then instructed to proceed to the mines, and put the mill in operation. He found it to be of the usual Californian pattern, intended for battery and copper-plate amalgamation; the sands and slimes produced by the stamps flowed over 30 ft. in length of amalgamated copper plates, and the tailings through Hendy's concentrators, the produce being amalgamated in two flat-bottomed grinding pans of a capacity of 1000 lbs. of ore each per charge. As the ore contained gold in an excessively finely-

divided state, associated with from 10 to 20 per cent. of sulphurets, this process failed to give satisfactory results, by far the greater portion of the gold escaped amalgamation in the mortars and on the plates, and passed to waste in the finest slimes on which the Hendy's concentrators would not act. The author, therefore, determined to concentrate before amalgamation, and as the first principle in concentrating stamp-work consists in assorting or classifying the sands, he led the pulp (crushed ore with water) from the mortars directly into a slime-separator.

The 10-stamps, each of which revolved automatically and weighed complete 750 lbs., were contained in two mortars, and were driven at a speed of 60 blows per minute, with a 9-in. drop, discharging through iron wire screens with 1600 holes to the square inch. Some difficulty was experienced at first from the choking of the sieves, caused by pieces of bamboo from the torches used in the mine being mixed with the ore; this was effectually prevented by enclosing the sieves on the outside with boards, leaving a space of 3 in. between the boards and screens, so that the water stood level on each side of the screens, the pressure being thus equalised. The bottom of this compartment was inclined from both sides towards the centre. At the lowest point there was an opening adjustable by a slide-gate, by means of which the discharge and the height of water in the mortars was regulated. The stamps crushed from 10 to 12 tons per 24 hours, or a little over 1 ton per stamp. The slime separator "Spitz-Lutte" for classifying the stamped ore depended for its action on the falling of the denser portion of the stuff through an ascending current of clear water, which at the same time carried the slimes upwards and out of the apparatus. It was made by inserting a wedge in a wedge-shaped box (Figs. 4 and 5), leaving a space of 4 in. between it and the inclined sides of the box; in the interior of the box at the bottom two funnel blocks *cc* were fitted, so that there was an opening 2 in. square connecting with the pipe *a*, $\frac{1}{2}$ in. in diameter. Clear water was admitted by the pipe *a*; the sands and slimes entered at *A*, passed down the space *B*, and came within the influence of the ascending column of water; the coarser and heavier grains fell through the funnel, were carried along the pipe *e* up the pipe *f*, and discharged through the mouth-piece *h*, $\frac{1}{2}$ in. in diameter; whilst the lighter sands and slimes which could not sink through the ascending clear water, were carried up *K*, and discharged at *m*. By varying the height of the mouth-piece *h*, and its diameter, the size of grain and the quantity of the sands separated were to some extent regulated.

The sands, which amounted to about 50 per cent. of the ore stamped, were concentrated on Rittinger's double side-blown percussion table, the concentrates being subsequently amalgamated in the pans. Fig. 6 is a plan, and Fig. 7 a front view of the table, 8 ft. square, made of boards planed smooth and divided into two parts, by means of a strip of wood *a*, similar strips *b* being placed on the sides. It was suspended by four iron rods *c*, at an angle of 60° . The inclination could be varied by means of the screws *d*. A heavy beam of wood *e* was bolted to the middle of the underside of the frame of the table, projecting some distance beyond it on each side; to one end of this beam was attached the wooden spring *f*, which could be screwed nearer to the frame *g*, thus increasing the strength of the stroke, whilst to the other end of the beam was attached the arrangement *h* for regulating the length of the stroke, shown on a larger scale in Figs. 8 and 9. Motion was imparted to the table by the rods *i* connected by the perpendicular rod *j* with the tappet *m* on which the cams acted. The percussion was produced by the striking of the heavy wooden beam *e* against the block *n*. The spring *f* had a tension of about 180 lbs., the length of stroke was $1\frac{1}{2}$ in., and the number of strokes 120 per minute. The sands from the classifier came on the distributing board at *P*, and clear water at *Q*. Under the influence of percussion and the flow of water the heavier particles of ore collected in curved lines, and were discharged at *R*, whilst the lighter gangue followed nearly straight down in the course of the water, passing off the table to waste at *S*; between these two there was a middle product obtained at *T*, which was reconcentrated. The movable tongues *w* regulated the quantity of material in either class, and were secured in their places by means of thumbscrews. One double table treated from $2\frac{1}{2}$ to 3 tons of classified sands per 24 hours, and acted very well.

The lighter sands and slimes separated by the "Spitz-Lutte," and discharged at *m*, Fig. 4, were conveyed by a launder to 12 Hungarian mills, arranged in two rows of six each, set one above the other, so that the lower row should receive the slimes from the upper. Fig. 10 gives a side view of these mills, one mill being shown partly in section; they were made of wood bound with iron, and were lacquered on the inside, having a depth of 5 in., a diameter at the bottom of 15 in., and at the top of 23 in., inside measurements. The discharge was 3 in. above the bottom. Each mill held 56 lbs. of mercury, or a depth of that metal of $\frac{1}{2}$ in. round the central cone, and $\frac{1}{2}$ in. round the sides. Between the runner and the surface of the mercury there was a space of $\frac{1}{2}$ in., and a like space between it and the sides of the mill. On the underside of the runner a number of strips or wings of iron, Fig. 11, were arranged radially as shown in Fig. 12, so as just to touch the surface of the mercury and clear the sides of the mill. The runners made from 18 to 22 revolutions per minute; the slimes were carried over the surface of the mercury by the centrifugal action developed, and were finally discharged into the lower mills, and from them into the launder *B*. At the close of each run the mercury was drawn off and strained, the amalgam obtained being retorted. From the launder *B*, as no blankets or hides were procurable the slimes passed over stakes 40 feet long, set at an angle of 75° , covered with scored boards, so arranged that the slimes always flowed over a width of 8 ft. of boards. These boards were each 5 ft. long and 1 ft. wide, the tail of one fitting into the head of the other. The first two rows of head boards were washed every half-hour, the second two rows every hour, and the last four rows every three hours. Although it required a great deal of labour to remove and wash the boards, they acted excellently in saving the fine gold.

The amalgamation of the concentrates from the percussion-tables

and boards, which amounted to about 10 per cent. of the ore stamped, was performed in two flat-bottomed iron grinding-pans, each having a capacity of from 800 to 1000 lbs. of ore per charge, or a little over 1 ton per pan in 24 hours. These pans made from 50 to 60 revolutions per minute, and after being charged with the right amount of water and concentrates the millers were gradually lowered, and grinding went on for about three hours, steam having meantime been admitted into the pulp, so that its temperature was about 150° Fahrenheit. Quicklime was next added to neutralise any sulphurates that might have been produced.

The millers were then raised $\frac{1}{2}$ in. from the dies, and about 100 lbs. of mercury added to each pan; amalgamation then went on for four hours, when the contents of the pans were discharged into the settlers for collecting the mercury, and the pans themselves, being thoroughly washed out with clear water, were ready for a fresh charge of concentrates. The slimes from the settler, after passing through agitators, which saved a further amount of mercury, were carefully stored in pits for re-treatment. The amalgam collected was retorted, and the gold melted into bars in the usual manner.

The pan-amalgamation gave over 90 per cent. of the gold contained in the concentrates, and the result of the combined treatment by concentration and amalgamation was an average of 82 per cent. of the gold obtained in the ore milled, which had an average assay value of $1\frac{1}{2}$ oz. per ton. Of the gold obtained about one-third was saved by the Hungarian mills, and the remainder by the pan-amalgamation of the concentrates. Samples of the ore and tailings were taken both by day and night, and assayed so as to check and control the working of the mill. The gold which escapes concentration and amalgamation was contained principally by the copper pyrites, which on stamping formed a very finely divided slime that would float on the surface of the water; some gold was also carried away by floured mercury. A horizontal engine, with cylinder 15 in. in diameter, and a stroke of $2\frac{1}{2}$ ft., supplied the power for working the mill, steam being furnished by a 40-horse power multitubular boiler.

The apparatus and machinery were made at the mine by Japanese blacksmiths and carpenters; the mill was also worked entirely by Japanese, who, for intelligence and attention to details, are not to be surpassed by the workmen of any country. As to the cost of milling, the author is unable to give exact figures, it being always difficult to do so when new works are started, more especially so in this case, where all material, such as castings, mercury, crucibles, &c., had been supplied from the United States, but probably it did not exceed 8*s.* per ton. In November, 1876, the author returned to Yedo, and the ore which had accumulated during the erection of the mill, having been stamped, and no steps having meantime been taken to properly lay open and develop the mines, they have since proved unable to supply the quantity of ore required by the works. The paper was accompanied by several drawings, from which the above engraving has been prepared.

KNAPPING MOTION STONE BREAKER.

The knapping motion stone breaker, manufactured by Messrs. W. H. BAXTER and Co., of Leeds, having now had several years trial, and having in every case given complete satisfaction, it is not surprising that its merits should have been fully recognised at the Calcutta Exhibition and honoured by the award of a gold medal. Messrs. Baxter and Co. may now be congratulated upon having been awarded the four last medals open for competition for stone breaking machines, and for the information of those engaged in work in which they are employed it may be mentioned that they will also be exhibited at the London International and Universal Exhibition at the Crystal Palace to be opened on April 23. The advantages of what is generally known as a pick-up blow are well known, and Messrs. Baxter may fairly attribute the great success of their machine to the fact that it is this kind of blow which it gives. They explain that the quicker you strike a stone the easier it is broken; that the sooner the driving-shaft is relieved of the pressure it has to exert the greater chance the fly-wheels have to regain their momentum, which decreases the power required from the engine, and that the nearer the toggle levers finish in a straight line the less pressure there will be on the driving-shaft at the finish of the forward stroke of the jaw, and therefore less friction.

It is unnecessary to detail the several modifications which have been introduced in the construction of stone breakers since the introduction of the first Blake machine; but the essential feature in the Baxter machine is that it has a peculiar compound toggle motion, which gives a varying speed to the jaw at different portions of its travel; to move the crank commencing with the forward movement of the jaw, the first quarter of a revolution of the fly-wheel, the jaw moves three-quarters of its forward movement, the second quarter it moves the remaining quarter, the third quarter the jaw returns one quarter of its move, and the completion or last quarter of the revolution it gives the remaining three-quarters of its movement, so that the finish of the backward and the commencement of the forward movement is much quicker at this half the revolution than the other, being as much quicker as three is to one, taking all the machines running at the same speed (although this can be run much faster), the blow in Baxter's machine will be nearly as quick again as in all others, which of necessity must require less power to do a given amount of work, produce a more cubic sample of road metal (owing to the sudden action causing the stone to rebound and change its position in the jaws of the machine), produce less waste in chippings, and when required for fine crushing the irregular movement prevents the material from sticking to the jaws, therefore turns out more material. The movement of the jaw can be regulated to suit any kind of material, and as a soft or brittle stone this is of vital importance, as it is very difficult to know what movement is required until you see the material in the machine. Baxter's patent is the only machine which possesses this arrangement, and which any ordinary workman can regulate in a few minutes. From the different character of the work done it is easy to recognise whether it has been operated upon by a Baxter or by another machine, and from the experience of five or six years' working it is found that when once the Baxter system is adopted there is no inclination to revert to those which it replaces.

MODERN PROGRESS IN MINE ENGINEERING—No. V.

BY H. BRAMALL, M. INST. C. E.*

In the economical unwatering of mines no very manifest progress has been made in modern times. Forty or fifty years ago the Cornish pumping engine had been brought to a degree of efficiency and economy which has not been surpassed by any more recent type, but its large first cost and generally ponderous character has led to the introduction of many forms of direct acting engines, cheaper, simpler, and more easy of application if somewhat less economical in subsequent working. Many of these placed underground are now forcing columns of water to vertical heights of as much as 600 and up to 1100 ft., the only encumbrance in the shafts being the steam and water pipes, and as the pumps are double acting and the flow of water practically constant these pipes for a given discharge may be very considerably smaller than would be required for ordinary lift-work. Direct acting engines are either rotary (controlled by fly-wheel) or non-rotary, and of the latter class the one designed by Mr. Davey, with his beautiful differential valve gear, may be cited as an excellent example. This valve gear has also been applied to control Cornish engines with the best results. As might be expected under such heavy water columns some trouble has been experienced with the valves or clacks, and Mr. Davey has got the best results from a modified form of Harvey and West double beat valve. Direct acting pumps actuated by hydraulic power have been found very useful in draining dip workings, the dispensing with rods and substitution thereof for a simple line of pipes being a very great convenience, and at Clausthal a pair of rotary engines has been erected, driven by

* President's Annual Address to Liverpool Engineering Society.

a hydraulic head of 1959 ft., the pumps being 13 in. diameter and 24 $\frac{1}{2}$ in. stroke, capable of forcing at 12 revolutions per minute 330 gallons to a height of 750 ft., the percentage of useful effect being 35. At lower speeds this duty sinks, and at three revolutions is only 15 per cent., and the cost of the installation was very great. It could only be under very exceptional circumstances that this would be repeated. In Germany, Rittinger's pump with a tubular rod is regarded very favourably, and has of late been extensively adopted. Amongst minor but important details the substitution of wrought-iron for cast in main engine beams may be mentioned, the form given being either rolled slabs as at Clay Cross or built up plate web girders.

In metalliferous mines, and especially in Cornwall where fuel is costly, great attention has always been paid to the construction and setting of boilers, and to contrivances to economise fuel. It is only in recent years, however, that the increasing value of small coal, and perhaps less indifference among managers, have caused these matters to receive the attention at collieries to which they are entitled. And accordingly we find the antiquated egg-ended externally fired boiler has followed in the wake of its predecessors—the "haystack" and "wagon," and has been displaced by the Cornish or Lancashire flued boilers, often with conical tubes and sometimes with mechanical stokers, and where coking is practised the escaping gases instead of being a nuisance in the vicinity are now conducted under the boilers and utilised in the generation of steam. In some cases by the aid of gas producers refuse coal is thus utilised, while boilers, pipes, and cylinders are carefully covered to prevent waste of heat (silicate cotton being about the best material for the purpose), and the warming of the feed water in some manner by otherwise waste heat is very generally practised.

That very difficult problem how safely to light our fiery mines remains unsolved. No very great advance has been made in recent years, and we still await the discovery of a safe safety-lamp. The lamps invented by Davy, Stephenson, and Clanny, nearly 70, and by Mueseler over 40 years ago, none of which are absolutely safe are still in very general use. The simple expedient of placing the Davy in a close shield or tin can has diminished the risk, and the Marsaut improvements have added to the efficiency of the Mueseler. In some collieries it is now the practice to test each lamp before use by contact with or immersion in gas. The electric light is in use for lighting surface operations, such as screening, &c., for which it is well fitted, and it has been tried underground but not with very satisfactory results. As a miner's lamp none of the forms yet proposed are of service. The miner's lamp must be self-contained, no lamp requiring a detached battery or having wires attached is of any use; it must give at least 12 hours sustained light, must be portable and admit of being placed in almost any position to suit the requirements of the moment, and ought not to exceed 3 to 4 lbs. weight in its complete state, and it must not require any but the very slightest attention on the part of the miner to keep it in order during work.

The furnace as a means of producing a current of ventilation is being rapidly superseded by mechanical means. More than three centuries ago fans were in use on a small scale for this purpose, but it is only in recent years that they have been employed of sizes and capabilities commensurate with the magnitude of modern collieries. The several types in common use, with their efficiency, may be classed as follows:—

Type.	Name.	Efficiency.
Closed cased fan	Guibal	40 to 61 per cent.
"	Schiele	46 to 49 "
Open running fan	Waddie	53 "
Displacement machines	Struve	58 "
"	Root	48 "
"	Nixon	46 "
"	Cooke	37 "
Screw	Lemire	23 "
	Pelzer	?

The best fans are decidedly more economical than furnaces, and even were this not so their greater safety ought to lead to their exclusive adoption in every mine in which there is a possibility of explosive gas ever being met with.

Although in the means of generating a powerful ventilating current we may claim considerable improvement the best methods of distribution are not always practised, and notwithstanding that nearly 80 years have passed away since Buddle introduced the system of spitting the air and district or panel airing we find collieries where the advantages thus to be gained are lost sight of. In steep mines also more attention should be paid to ascensional ventilation.

To ascertain the quantity of air passing through a road it is no longer necessary to guess by the aid of a puff of powder smoke or by carrying a candle with flame kept upright as did our fathers. We possess now very accurate and reliable anerometers which 50 years ago were quite unknown, those of Biram (revolving vanes) and Dickenson (vertical vane) being most convenient and largely used.

In what state does fire-damp exist *in situ*? and what are the effects of varying atmospheric pressure upon its liberation? and is the barometer of any value as a warning of coming danger? These are questions which early attracted attention, and have been much discussed. Mr. Wood has carried out a most extensive series of elaborate

and careful experiments to ascertain the conditions as to the solid coal, and Mr. Corbett has rendered a similar service in respect of goafs, and the conclusion seems to be in both cases that the barometer affords no reliable indications when to expect danger from gas in mines.

The influence of coal dust in explosions has been carefully investigated, and though it is not established that dust alone may be the cause of an explosion it is conceded that in a dusty atmosphere the addition of a smaller quantity of fire-damp is requisite to bring it to the explosive point, and that the effects of an explosion may be intensified and extended by the presence of dust, and accordingly in many very dry and fiery mines the main roads are kept regularly watered, or still better by sprinkling salt upon the dust the same object is attained without the liability of causing the floor to heave and swell. Several instruments have been devised for detecting the presence of minute quantities of fire-damp in air, such as those of Forbes, Ansell, and Liveing, but none of them are of any practical use to the operative miner, and they are chiefly interesting as very ingenious scientific toys.

A review of progress would not be complete without some mention of the increased safety with which coal mines are now worked. In 1851 the deaths from accidents of every kind in the coal mines of the United Kingdom were 4·56 per 1000 people employed, while in the decade ending 1860 the ratio was 4·07, in the decade ending 1870 it was 3·32, and in the decade ending 1880 it was 2·35, and for the two years 1881-2 the ratio is 2·081. Without attempting to go minutely into particulars it may be briefly stated that this marked improvement is entirely in those classes of accidents in the prevention of which improved machinery and appliances, increased knowledge, better discipline, and more competent supervision may be expected to have greatest effect. While on the subject of accidents mention may be made of the Fleusse apparatus, by aid of which the explorers at Seaham Colliery were enabled to penetrate into the workings a distance of 400 yards in an irrespirable atmosphere. In cases of accident causing serious injury, the patient's sufferings have often been intensified by his being jolted to his home in a stiff springless cart, but the labours of the St. John's Ambulance Association have extended a knowledge of how to give first aid, and ambulances or stretchers of a simple kind, by which the pain consequent on removal is much lessened, are now provided at many large mines, and ought to be at all.

CURIOUS PROPERTIES OF COAL GAS.

It is surprising, said Mr. THOMAS FLETCHER, F.C.S., in an interesting lecture delivered at the Gas Exhibition, Cheltenham, on Monday, how little is known concerning the use of gas. Until within the last few years most people have been under the impression that it was merely a means of obtaining light, and even for this purpose it has been, and, I may say, still is, most wastefully used. The majority of people seem to think that if they only burn a quantity of gas it matters very little how the gas is burnt, or what burners are used. As an example, I often see ordinary sitting-rooms about the size of my own, 15 ft. by 20 ft., lighted by three or four burners, each being most carefully enclosed with opal or ground glass globes, which waste about half the light. My own sitting-room is lighted by one No. 8 Bray's burner, and I may safely say that few rooms are so well lighted. People are not generally aware that one large burner gives far more light than two separate burners, each consuming 4 ft. per hour, and that one burner without shade is about as good as two with opal or ground glass globes. Many people prefer the appearance of burners with glass globes, but they must bear in mind that this entails a much larger gas consumption for the same light, and also more heat and vitiated air in the rooms. A great argument against the use of gas is the smoking of ceilings, &c., and curiously enough these complaints come strongest from those people who burn their gas carelessly under excessive pressure without control, and under such circumstances that smoke is almost impossible. The liability to true smoke occurs only in places such as open shops, where the flames are blown about very much, or in those places where first-rate burners are used under the best conditions, that is, just verging on the smoking point. The fact is that the supposed smoke is not smoke at all, the discolouration is grey or brown, not black, as it would be with smoke, and is, I think, caused only by the dust in the air being more or less burnt, caught in the ascending current of hot air, and thrown against the ceiling. When the gas is first lighted the ceiling is cold, and the water formed by the combustion of the gas condenses, forming a surface to which dust readily adheres, and if we use any burner, whether oil or gas, in one fixed position, the discolouration above it is exactly the same, depending entirely on the power of the burners used.

Gas can be burnt most efficiently for heating purposes without any flame or visible combustion; in fact, flame is only a sign of incomplete or imperfect combustion, and looking forward to a possibly near future, I believe that all fuels, both solid and gaseous, will be burnt for heating purposes, without any flame. I will show you how deceptive appearances are by making an enormous flame, in which I am burning, probably, at the rate of 100 cubic feet of gas per hour.

This flame is delusion; like an empty bottle it is all outside and very little use. Passing through the thin film of flame on the outer surface it is quite cold inside, and this I will easily prove. If it were large enough, I should not have the slightest objection to walk into the middle of it and remain there; not being large enough for myself, I will protect the stem of this thermometer from the outer film of flame, and put the bulb inside. It will register about 120° Fahr. I will replace the thermometer bulb by a ball of tissue paper, and you see it is unchanged. I will protect part of my hand from the outer film of flame, and pick the paper out with my bare fingers; and, lastly, will place a small paper of gunpowder in the centre of the flame, and let it remain there. Such a flame as this, notwithstanding its apparent fierceness and size, is of little use. If you place a cold vessel in it it makes an abominable smell. It is a mixture of gas and air, but in incorrect proportions, owing to the faulty construction of the burner, and the mixture can only burn on the surface where it comes in contact with the external air. By increasing the air supply to the correct proportion, as you see, the flame is reduced in size, becomes solid to the centre, and explodes the gunpowder. Carrying on my experiment still further, I now use a different burner of a much smaller size, and use air under pressure from a small foot blower, as the burner I have been using would, with an air blast, require about 1000 cubic feet of gas per hour to work it, and I wish to show you, as near as possible, the same quantity of gas being now burnt under different conditions. This burner you now see is only 2 $\frac{1}{2}$ in. across the surface, yet, with the assistance of a small blower, it may be made to burn perfectly up to 200 cubic ft. or more per hour, sufficient to make steam for a two or three horse-power engine. You can judge of the heat of the flame by the iron wire I put in it, which you see burns almost like paper.

Changing the burner once again I use a large blowpipe, which gives a most intense flame; in fact, the advantage of a blowpipe consists in its burning as much gas as possible in an exceedingly small flame of great intensity. Now, if you will watch me carefully, I will direct the flame on this ball of fine scraps of wrought-iron, a metal which is practically infusible in an ordinary furnace, and without turning off the gas I will pinch the gas supply pipe so as to extinguish the flame. The gas is still there, burning as before, but burning entirely without flame, and as you see the iron melts and runs like water instantly. That there is no flame I will prove to you by putting a slip of paper before the blowpipe, which, as you see, is not burnt or discoloured; that the gas is burning and has not been interfered with I will prove by stopping the blower, and allowing the gas to burn with a flame as at first. I have now taken you from a cold flame, into the centre of which I put my fingers, to an intense heat without any flame, and, as you see, the heat increases as the flame reduces until at its maximum the flame disappears altogether. The combustion of gases appears to be a succession of explosions, either so quick as to be silent to human ears, or so slow as to make, if continued, a musical sound. To enable you all to hear this I shall, as you will no doubt admit, pass the bounds of what may be considered classical music, but I will make these two burners speak in their own natural tones. If they are not as charming as musical instruments they have the one great advantage that a little of it goes a very long way, and you will not desire that my musical performance shall be a long one. The quantity is amply compensated for by the quality, which is certainly not excelled by anything from a donkey to a fog-horn. Bear in mind that the application of gas to music is in its infancy, and there is certainly room for improvement in the future.

CORNISH PUMPING-ENGINES.—The number of pumping-engines reported for February is 13. They have consumed 1406 tons of coal, and lifted 10·1 million tons of water 10 fms. high. The average duty of the whole is, therefore, 48,700,000 lbs. lifted 1 ft. high by the consumption of 112 lbs. of coal. The following engines have exceeded the average duty:—

Carn Brea—76 in.	Millions
McLanear—76 in.	56·6
West Basset—Grenville's 70 in.	51·3
West Basset—Thomas's 60 in.	58·5
West When Seton—Harvey's 65 in.	65·1
West Wheal Seton—Rule's 70 in.	61·0

COPPER, TIN, AND SPELTER.—Messrs. FRY, JAMES, and CO. (March 20) writes:—In copper there has been uninterrupted heaviness throughout the market for the past fortnight, with a decline of 20s. per ton in value of all descriptions excepting manufactured, for which there has been a steady supply of orders. Tin has experienced some sharp fluctuations between 84 $\frac{1}{2}$ ss. and 82 $\frac{1}{2}$ ss. per ton, the transactions at the lower rates having been the most numerous. Spelter is fairly steady, but participates in the general dullness.

HOLLOWAY'S PILLS AND OINTMENT.—The great variations of temperature, the fogs, and the foul vapours which permeate the atmosphere, try the respiratory channels terribly; hence arise hoarseness, quinsies, loss of voice, bronchitis, and the whole train and endless variety of throat and chest affections which now prevail. Neglect of these in their early stages is almost criminal, as many a life may be saved through early and prompt treatment by means of Holloway's well-known remedies. This treatment can be readily and easily carried out, and soon disposes of the attack in a most satisfactory manner, by restoring the balance between the circulation and respiration, by lessening the inflammation, abating the febrile symptoms, and by soothing the irritability of the nerves.

The New System for Working Gold and Diamond Alluvials.

THE "BALL PATENT."

9, BUSH LANE, CANNON STREET, LONDON, E.C.

This new system renders River and Placer Marsh Swamps and Plateau Mining the cheapest of all. No head of water required as per Californian Hydraulic System. Only a few tons of water wanted a day.

ABSOLUTELY CLEARS THE LAST PARTICLE ON BED ROCK OR CLAY BOTTOM.

No fall required for dumping tailings. Depths of rivers, floods, and other difficulties entirely surmounted. 600 tons a day raised, dispersed, washed, and dumped per day for 31. a ton by smallest plant, 1200 tons by second size plant at 2d. per ton.

See *Mining Journal*, 19th January and 16th February, 1884, on THE CHEAPEST METHOD OF TREATING AURIFEROUS ALLUVIALS.

NOTICE—TO MINING INVESTORS.

In such esteem is the system held that several extraordinary participations in Gold Alluvials are offered simply for the trouble of putting plant on certain concessions and working it.

Syndicate A completed.

WANTED, investors in B Syndicate, composed of 750 Shares of £10.

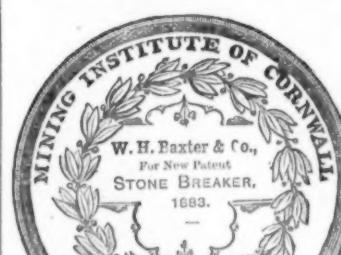
Profits are so enormous that it is deemed advisable not to publish them, but they will be communicated to bona fide inquiries.

SUBSCRIPTION NOW OPEN.

Apply by letter first, or personally at above address,
Mondays and Tuesdays, 11 to 2 P.M.

ALSO AWARDED GOLD MEDAL AT CALCUTTA EXHIBITION.

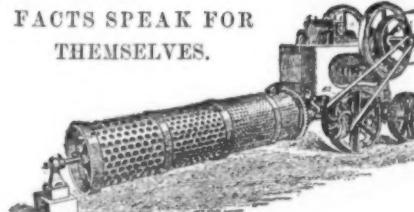
BAXTER'S PATENT KNAPPING STONE BREAKER.



1881.



FACTS SPEAK FOR THEMSELVES.

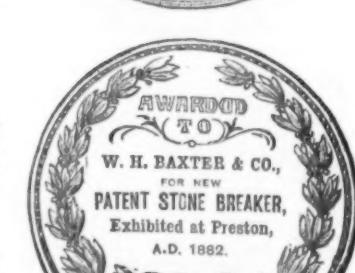


To Mr. Baxter, Leeds.

Cunderford, Feb. 13, 1883.

DEAR SIR,—I am pleased to be able to tell you that the Machine works splendidly. We are breaking 16 trucks a day now, and we thought it a good day's work to do 10 a day with the old Machine, so you can see the difference. I had a gentleman looking at it yesterday, and he was surprised to see it work so easily.

Yours truly, E. ORGAN.



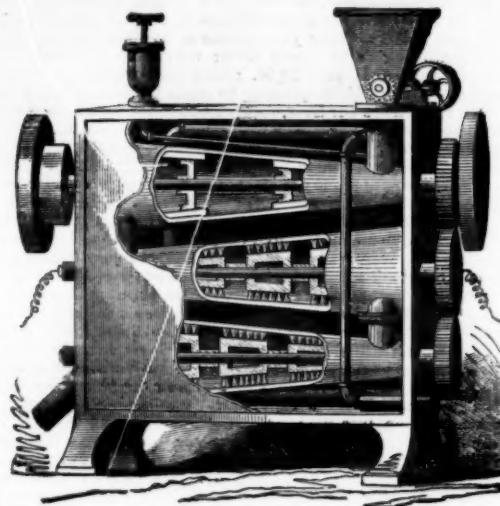
PATENTEE AND SOLE MAKERS.

W. H. BAXTER & CO., ALBION STREET, LEEDS.

NOVEL ELECTRO METALLURGICAL MACHINE.

PROFESSOR JAMES MANES AND SONS call the attention of miners, mineowners, capitalists, and others interested in the working of gold or silver mines to their new Electro Metallurgical Machine for extracting fine and rusty gold from sands or tailings of stamp mills, or the sands of hydraulic gold diggings, or from the black sands on the coast of Oregon or California, and other parts of the world where gold is found.

The problem that has long troubled the worker of free-milling gold and silver ores is a method to save the mineral now lost in the tailings of stamp mills or flumes. This alone, if it could be saved, would amount to many million dollars profit each year, besides enabling the working of much territory which is now lying idle for want of an economical and thorough process of treatment.



Prof. James Manes and Sons, of Denver, Colorado, U.S., have invented a machine (represented in the above engraving) which it is claimed will save nearly the entire amount of mineral which passes through it, the loss not being over 10 per cent., and in many cases not in excess of half that amount. The machine is a cheap and practical process—it never need stop for charging or cleaning up, being nearly self-acting. Steam, electricity, and mercury are used in the process of extracting the mineral.

This machine or amalgamator is adapted for free-milling gold or silver ores, or refractory after roasting. It consists of a series of three or more large cylinders, wider at one end than the other, placed one above the other in a horizontal position, a shaft or spindle running through the centre of each.

The ore and mercury are fed into the first cylinder, passing into the second, and then to the third. The first cylinder is furnished with steel brushes which nearly touch the sides of the cylinder, and revolve at a good rate of speed, mixing the mercury and ore. The second cylinder is furnished with large steel brushes attached to the shaft or spindle, revolving at a high rate of speed; through this a current of electricity is furnished by a Westinghouse dynamic electro machine, which materially assists in gathering the particles of very fine gold together, and thoroughly amalgamating the metal and mercury. The third cylinder is similarly furnished to the second; into this the amalgam passes, and is again acted upon and mixed by the brushes to catch any gold which might have escaped amalgamation in the second. A fourth cylinder may be used if found necessary.

The amalgamated pulp then passes through a revolving copper drum, plated with quicksilver inside. As the drum revolves it takes up the most part of the amalgamated gold. As the inside of the drum is constantly washed with a spray of water from perforated pipes fixed inside of said drum, a clean-plated surface is constantly brought into contact with the pulp or tailings as it passes out from the cylinders. After leaving the drum it falls down on to incline copper plates, the same as is now used in stamp mills.

The amalgam can be collected from the drum and plates without stopping the machine, and any live quicksilver that passes will be caught in siphons. The tailings are carried off with the water. The machine when attached to the flume will be driven by the waste water; it sifts the fine sands from the coarse gravel, and amalgamates it as above.

The specific points claimed by Prof. Manes and Sons in their patent are:

- 1.—The saving of almost all the mineral passing through the machine.
- 2.—The loss being less than 10 per cent.
- 3.—The entire absence of loss of the amalgamated material, thereby saving all the mercury, which, with the processes now in use, there is a large loss both of mercury and the precious metal.

4.—The small cost per ton at which the ore can be treated.

By the addition of the powerful current of electricity that passes off the revolving brushes, the most minute particles of gold will be caught and retained, which in the ordinary flume and stampa passes off with the water; this often amounts to a large percentage.

The inventors state that if English stock companies will give their assistance to work the black sands of Oregon and California, by paying for the building of the machines, they will take a share of the gold for their services, or they will send their machines to any part of the world, or will sell patent rights to those desiring any of their patent machines or revolving furnaces for roasting or melting ores, ball pulverisers, &c.

Prof. James Manes and Sons are agents for the Morey and Sparey Ball Pulveriser, that crushes and pulverises at the same time, and does as much work as eight stamps in a day, crushing either wet or dry.

PRINCIPAL OFFICE OF
Prof. MANES and SONS,
No. 9, Windsor Block, Denver, Colorado,
U.S.A.

All our machines and furnaces are made by the Colorado Iron Company of Denver, Colorado, the most extensive mining machine works in America.

W. F. STANLEY

MATHEMATICAL INSTRUMENT MANUFACTURER TO H.M.'S GOVERNMENT, COUNCIL OF INDIA, SCIENCE AND ART DEPARTMENT, ADMIRALTY, &c.

MATHEMATICAL, DRAWING AND SURVEYING INSTRUMENTS of every description, of the highest quality and finish, at the most moderate prices.

Price List post free.

ENGINE DIVIDER TO THE TRADE.

ADDRESS—GREAT TURNSTILE, HOLBORN, LONDON, W.C.

FROISETH'S NEW AND REVISED MAP FOR 1875.—Size 40 by 56 inches, scale 5 miles to the inch. Handsomely engraved, coloured in counties, showing the Towns, Settlements, Rivers, Lakes, Railroads, Mining Districts, &c., throughout the Territory, and all the Government Surveys to date. Mounted on cloth, £2; half-mounted, £1 12s.; pocket form, £1.

Also, GENERAL MINING MAP OF UTAH, showing twenty-eight of the principal Mining Districts adjacent to Salt Lake City, and location of the most prominent mines. Price, pocket form, 6s.

Also, NEW MAP OF LITTLE AND BIG COTTONWOOD MINING DISTRICTS showing the location of over Four Hundred Mines and Tunnel Sites, together with the Mines Surveyed for United States Patent. Price, sheets, 6s.; pocket form, 6s.

For sale, and supplied by—
TRUBNER and CO., 57 and 59 Ludgate Hill, London.
B. A. M. FROISETH, Salt Lake City, Utah, U.S.

M. R. P. S. HAMILTON (late Chief Commissioner of Mines for the Province of Nova Scotia), PRACTICAL GEOLOGIST, MINING AGENT, and MINING ENGINEER, HALIFAX, NOVA SCOTIA.
PURCHASES and SALES OF MINING PROPERTY effected, with careful regard to the interests of clients.

MONEY LENT, at EIGHT, NINE, and TEN PER CENT., on FIRST MORTGAGE of FREEHOLDS for IMPROVEMENTS and STOCKING, said freeholds in the Province of MANITOBA.
Address, HERBERT C. JONES, Solicitor, 29, Masonic Hall, Toronto.

THE TUCKINGMILL FOUNDRY COMPANY,

(TUCKINGMILL FOUNDRY AND ROSEWORTHY HAMMER MILLS).

CAMBORNE, CORNWALL,
Engineers, Iron and Brass Founders, &c.



REGISTERED TRADE MARK.

MANUFACTURERS OF EVERY DESCRIPTION OF

REGISTERED TRADE MARK.



PUMPING WINDING AND STAMPING ENGINES
ALL KINDS OF
MINING MACHINERY, SHOVELS, AND
MINERS' TOOLS;



ALSO OF
BLAKE'S STONE BREAKERS.

ESTIMATES GIVEN UPON INDENTS AND SPECIFICATIONS,
ILLUSTRATED CATALOGUES POST FREE ON APPLICATION
LONDON OFFICE: 85, GRACECHURCH STREET, E.C.

ESTABLISHED 1852.

SYBRY, SEARLS, AND CO.,

MANUFACTURERS OF THE

CELEBRATED MINING STEEL, BRANDED

Cast Steel, Shear, Blister, Spring, Hammer, and Pick Steel.

Special Rock Drill Steel.

Mining Tools, Files, Saws, Hammers, and Picks.

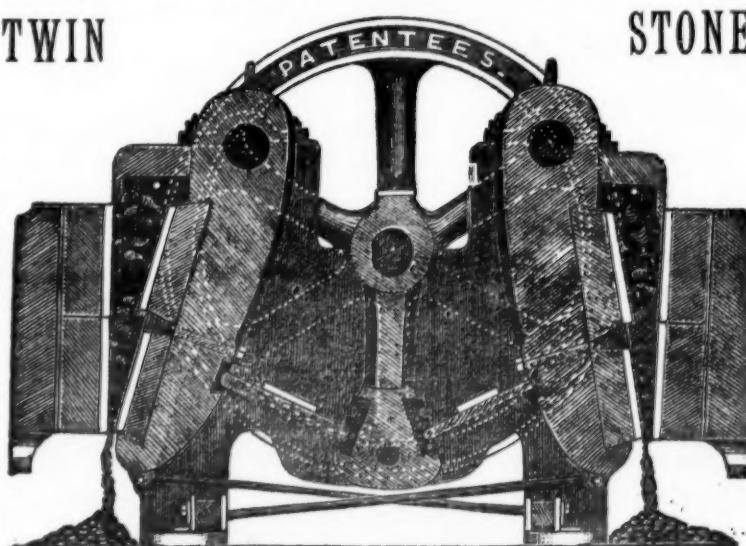
CANNON STEEL WORKS, SHEFFIELD.

S. MASON & CO.'S New Patent Improved
BLAKE'S TWIN STONE-BREAKER.

Leicester.

THE CHAMPION OF THE WORLD.

A few advantages of the Twin Stone and Ore Breaker over all others:—1st. It utilises the waste power known to exist at the back of the single machine.—2nd. It will do twice the work of any other.—3rd. It takes no more power to work it, as the stone at one end helps to break the stone at other.—4th. You can either use one or both ends.—5th. The price is no more than others

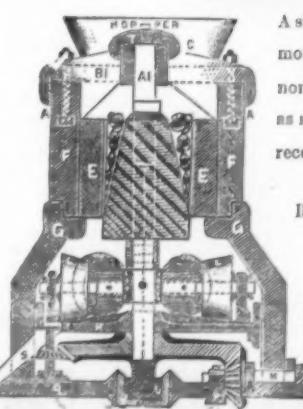


England.

ask for single machines.—6th. It has double cushions in Pitman, so as to break small or large sizes.—7th. You can break, if wanted, small at one end and large at the other.—8th. By putting one toggle plate in top groove of one side of pitman, and the other in bottom of the other side, it gives a rocking movement, so that it cracks the stone and makes it in a more cubical shape than any other in the world.

S. M. and Co.'s
Single Stone-Breaker
WITH SCREEN.
The Champion Machine of the
World as a Single Machine.

Lists and
References free
on Application.



A single 12 by 7 Stone Breaker, with cracking motion, for £45. Guaranteed to be second to none in the World. Money refunded, if not as represented, one month after delivery, on receiving Machine back.

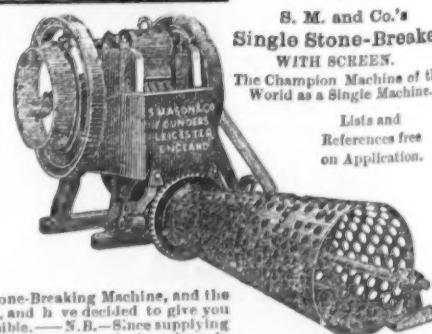
READ THIS:—

From the Kettering Iron Co. Kettering

GENTLEMEN,—

In reply to yours regarding our inspection of Stone-Breaking Machine, and the test with you and Baxter's we think yours the best, and have decided to give you the order. Please to get us a 20 by 9 as early as possible.—N.B.—Since supplying it we have received orders for another from the Company, and six others in Kettering and the district.

S. MASON & CO.'S PATENT BREAKER, GRINDER, AND PULVERISER,
All in one operation, either wet or dry material. Send for Lists and
Testimonials. Machines made without Pan and Rollers for Kibbling purposes.



This Machine is made to work 150 r.p.m. per min.

SEND FOR A PRICE LIST OF
JOHN BLAKE'S PATENT SELF-ACTING HYDRAULIC RAMS.
FOR RAISING WATER FOR THE SUPPLY OF
TOWNS, VILLAGES, IRRIGATION, RAILWAYS STATIONS, MANSIONS, FOUNTAINS, AND FARMS.

No Cost for Motive Power, which is obtained from a Stream of Water passing through the Rams.

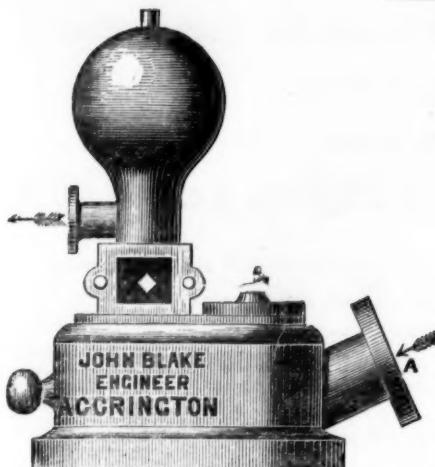


Fig. A.—This Ram raises a portion of the same water that works it, and a special one, on this principle, can be supplied at extra prices to force to a height of 500 ft., and by a second Ram to a height of 950 ft. The patterns vary with the different sizes.

NO OILING OR PACKING REQUIRED.

Made in Sizes to raise 300 to 500,000 Gallons per day.

Will force to a height of 1500 feet.

Special Rams for High Falls to send up Two Gallons out of every Five Gallons passing through them.

* * * ESTIMATES WILL BE GIVEN ON RECEIPT OF THE FOLLOWING PARTICULARS:—First, the fall (in feet or inches) which can be obtained from the stream, spring, cistern, or other source of supply; second, the height and distance to which the water has to be forced; third, the approximate quantity falling per minute, and the number of gallons required to be raised in a day of twenty-four hours, and if a B Ram is required, the depth and horizontal distance from the Ram to the clean water should also be stated. Gun metal is liberally used in the construction of these Rams, and the prices include gun metal foot and stop delivery valve, &c. They are fitted up in a most substantial and workmanlike manner, the first cost being only a secondary consideration.



Fig. B.—This Ram whilst worked by a stream of impure water will pump clean water from a well or spring. Rams on this principle can also be supplied to force to a height of 1500 ft. Patterns vary with the different sizes.

PRICES OF RAMS OF FIGURE A MAKE TO FORCE TO MEDIUM HEIGHTS.

No. of the size of the Ram.	Number of Gallons per day of 24 hours, the Ram will raise where there is sufficient working fall as compared to the height the water has to be forced.	Price.
2	300	12 0 0
3	600	15 0 0
4	1,000	18 0 0
5	1,500	21 0 0
6	2,000	25 0 0
7	3,000	30 0 0
8	5,000	35 0 0
9	7,000	40 0 0
10	10,000	48 0 0
11	15,000	58 0 0
12	20,000	70 0 0
13	35,000	100 0 0
14	50,000	140 0 0
15	70,000	210 0 0
16	100,000	250 0 0

SUPPLIED TO

His Royal Highness the Duke of Connaught
His Highness the Maharajah of Kashmir
His Grace the Duke of Cleveland
His Grace the Duke of Portland
The Most Noble the Marquis of Downshire
The Right Hon. the Earl of Crawford and Balcarres
The Right Hon. the Earl of Derby
The Right Hon. the Earl of Ilchester
The Right Hon. the Earl of Romney
The Right Hon. the Earl of Granard
The Right Hon. the Earl of Beauchamp
The Right Honourable the Earl of Caledon
The Countess de Morellis
The Right Hon. Lord Viscount Galway
The Right Honourable Lord Viscount Bridport
The Right Honourable Lord Viscount Olifden
The Right Honourable Lord Leconfield
The Right Hon. Lord Ribblesdale
The Right Honourable Lord Hatheron
The Right Hon. Lord Leigh
The Right Hon. T. Sootheron-Escourt
The Right Hon. R. More O'Farrell
The Honourable Sir William Ventris Field
The Hon. George Kenyon
Admiral Sir George Broke-Middleton, *Broke Hall*, Suffolk
Major Gen. Sir Henry Marsham Havelock-Allan, *Bart.*
Gen. Gerard Potter Eaton, The Pole, Cheshire
Sir Henry A. Hoare, Bart., Stourhead, Bath
Sir William Fielding, Bart., Feniscowles, Blackburn
Sir Robert Menzies, Bart., of Menzies
Sir Humphrey De Trafford, Bart., Trafford Park, Manchester
Sir Michael Robert Shaw-Stewart, Bart.
Sir Henry W. Ripley, Bart., Acacia, near Leeds
Sir Michael Arthur Bas, Bart., M.P., Burton-on-Trent
Sir W. C. Worley, Bart., Hovingham Hall, Yorks.
Sir Kenneth Smith Mackenzie, Bart.
Sir William Eden, Bart., Windlestone, Ferry Hill
Sir A. Woodiwiss, The Pastures, Derby
Colonel Starkie, Lovell Hall, Blackburn
Colonel Milligan, Cauldwell Hall, Burton-on-Trent
Colonel Towneley, Towneley, Lancashire
Colonel Hargreaves, Maiden Erleigh, Berkshire
Colonel Tremayne, M.P., Carclew, Cornwall
Colonel Mitford, Mitford Castle, Northumberland
Colonel Leyland, Nantford Hall, Ruthin
Colonel France-Hayhurst, Davenham Hall, Northwich
Colonel R. R. Jackson, Lostock Hall, Lancashire
Colonel J. E. Foster, Sansom Seal, Berwick-on-Tweed
Major J. F. Trist, Tristford, Totnes
Major Hardman, Rawtenstall, near Manchester
W. Bromley-Davenport, Esq., M.P., Capsthorne, Cheshire
V. P. Benett-Stanford, Esq., M.P., Pyt House, Wilts.
C. F. H. Boikow, Esq., Marton Hall, Middlesbrough

TESTIMONIALS.

From Mr. A. J. Rutherford, Agent to C. F. H. Boikow, Estate Office, Marton Hall, Middlesbrough, 26th September, 1883.

"Dear Sir,—I am glad to say that the Rams you put down on the Hambleton Estate for Mr. C. F. H. Boikow, are working very well. You undertook, with 10 gallons per minute, to send up 1500 gallons a day, and with enough water to work the Rams at full power, 2000 gallons a day. With a supply of 11½ gallons per minute they are lifting 2200 gallons, and when working full power, 3100 gallons per day are sent up to a height of nearly 400 ft. They made a clear start, and have gone well since."

The Delivery Pipe, in the above case, is 9000 ft. in length.

From Mr. Henry Robinson, Engineer to the Stockport District Waterworks Company, September 3, 1883.

"Dear Sir,—I can now report well of the two Hydraulic Rams we have fixed to your instructions for supply of Didsbury Village. 40,000 gallons per day was the quantity you promised they would force to a height of 68 ft., but on testing them I am convinced that 52,000 gallons is not the limit of their power, whilst the quantity of waste water used in driving them is not equal to half the capacity of the 6-in. pipe by which they are fed, and I am inclined to the belief that a more simple and efficient pump cannot be found."

From Horatio R. B. Peile, Esq., Commissioner to Sir Michael Shaw Stewart, Bart., Mansion House, Greenock, 13th August, 1883.

"I am glad to say the Ram you fixed at Castle Farm in November last for Sir Michael Shaw Stewart, Bart., continues a great success. The smallness of the driving water—2½ gallons per minute—is not more wonderful than the large proportion of water it sends up—viz., 720 gallons per day, through about 400 yards of delivery pipe, to an elevation of 75 ft."

From Messrs. Austin and Johnson, Architects, 3, Arcade, Pilgrim Street, Newcastle-on-Tyne, 20th September, 1883.

"The five Patent Hydraulic Rams—with about 2½ miles of Delivery Pipes—we employed you to fix on the Callalay Castle Estate, for Alexander Henry Browne, Esq., are so far very satisfactory, particularly when the small quantity of driving water, and the height and distance to which it is forced, are considered. The result is certainly all that you promised."

From Captain Townshend, Wincham, Feb. 10th, 1877.

"In answer to your enquiry, I am glad to say the Hydraulic Ram you sent me in November, 1875, is working exceedingly well, and gives no trouble. It will work when quite immersed, as it has been several times during this winter, forcing up water through a delivery pipe 900 yards long at the rate of 80,000 gallons per day, although you only promised 50,000."

From J. Spender Clay, Esq., Ford Manor, Lingfield, Surrey, August 9th, 1880.

"In reply to your letter of enquiry, I am glad to be able to say that the two Hydraulic Rams which you fixed here are working satisfactorily, and that out of 13 gallons 3 quarts per minute, the maximum yield of the spring, they deliver to the top of my house, distant a full mile from the spring, 4 gallons 1 quart per minute, or 6120 gallons per 24 hours, being 120 gallons above the quantity you guaranteed."

From Mr. John Archbold, Engineer to Messrs. Barber, Walker, and Co., Eastwood, Notts, October 21st, 1882.

"I am glad to inform you that the Hydraulic Ram you fixed for Thomas Barber, Esq., whilst working with a fall of 30 ft., and forcing to a height of 90 ft., through 200 yards of delivery pipe, is working exceeding well, throwing up 9 pints out of every 35 pints passing through it, thus giving 77 per cent. of useful effect."

From Mr. T. Barham Foster, C.E., 23, John Dalton Street, Manchester, 12th October, 1883.

"Dear Sir,—I have tested the Ram you contracted to fix on the Hints Estate, Staffordshire, for James Chadwick, Esq., to force 10,000 gallons per day of spring water through 500 yards of delivery pipe, to an elevation of 208 ft., whilst worked by river water falling 5 ft. 9 in., and am pleased to find that when at full power the Ram sends up 13,500 gallons per day to the height and distance named, and though the ram is now adjusted to work at only three-fourths its power, the work done represents over 57 per cent. of useful effect."

From Fred J. Turner, Esq., Agent to His Grace the Duke of Portland, Mansfield Woodhouse, August 30th, 1883.

"Dear Sir,—I have much pleasure in stating that the Hydraulic Rams which you erected last year for His Grace the Duke of Portland, at Lyndhurst, near Mansfield, and at Skelton, Ayrshire, are working very well, and they are most satisfactory in every way."

From Mr. E. W. Streeter, F.R.G.S., Diamond Merchant, Bond Street, London, and Sackville Place, Sussex, October 1st, 1883.

"Dear Sir,—When you surveyed the site at Sackville Place, Buxted, for the purpose of fixing a Ram with one mile of collecting and distributing mains, I was surprised and pleased when you named the quantity of water you could send up from the resources available."

"My bailiff prepared the ground to your instructions, and in 12 days from the arrival of your men, the Ram was in operation, sending up 20 per cent. more water than you promised to a height of 110 ft., and distributing a supply to a farm and several cottages on the way."

"I have pleasure in recording my entire approval of the work."

From J. R. Shaw, Esq., Arrowe Park, Cheshire, August 31st, 1883.

"I have much pleasure in testifying to the excellency of the two Rams you fixed here. One forces 7000 gallons per day of turbid water, and the other 4000 gallons per day of spring water, through more than 1000 yards of delivery pipe, to an elevation of 110 ft., and the working of the Rams is as satisfactory as the workmanship is creditable."

From Sir A. Woodiwiss, The Pastures, Derby, January 15th, 1883.

"Dear Sir,—In reply to your enquiry, I have much pleasure in informing you that the Hydraulic Ram you supplied and fixed for me in July last, is working as satisfactorily as could be wished, and has fully realised my expectations, and I have no hesitation in saying it is a decided success."

From Sir Robert Menzies, Bart., of Menzies, Rannoch Lodge, Rannoch, August 20th, 1880.

"The Hydraulic Ram which you fixed for me to supply water to Rannoch Lodge and Cannichur, two houses ½ of a mile apart, is a complete success. The extreme distance the water is carried is 1½ miles, and it is raised fully 100 ft., and though the elevations of the two houses are different, there is a regular supply of 7 quarts per minute to each house, which has never ceased since the Ram was set going about three months ago. Your Ram took the place of one previously tried on the same spot, and which did not succeed, and was in fact a complete failure."

From Mr. William Lait, Architect and County Surveyor, Compton Verney, Warwick, 16th January, 1882.

"I have much pleasure in stating that the Patent Hydraulic Ram I had from you for the Rev. J. Cardwell Gardner, of the Vicarage, Butler's Marston, and which you fixed there, is I consider remarkably successful, as indicated below."

"4120 gallons of water per day are passing through the Ram with a descent of 13 ft. 8 in. Out of this small quantity 1080 gallons are sent up to a height of 41 ft., showing 78 per cent. of useful effect, and the noise of its working is so slight as to be almost inaudible."

PRICES OF DOUBLE-ACTING RAMS OF FIGURE B MAKE TO FORCE TO MEDIUM HEIGHTS.

No. of the size of the Ram.	Number of Gallons per day of 24 hours, the Ram will raise where there is sufficient working fall as compared to the height the water has to be forced.	Price.
2	300	30 0 0
3	500	40 0 0
4	1,000	50 0 0
5	2,000	60 0 0
6	4,000	90 0 0
7	7,000	120 0 0
8	10,000	150 0 0
9	15,000	180 0 0
10	20,000	200 0 0
11	30,000	250 0 0
12	50,000	400 0 0
13	70,000	500 0 0
14	100,000	600 0 0

SUPPLIED TO

Edwin W. Streeter, Esq., F.R.G.S., Sackville Place, Buxted
Quintin Hogg, Esq., Holly Hill, Southampton
Alexander Henry Browne, Esq., Callalay Castle, Alnwick
John Bowes, Esq., Great Tew Castle, Durham
Bernard Hussey Hunt, Esq., Compton Pauncefoot, Somerset
J. A. Darlington, Esq., Bourton Hall, Rugby
St. Lawrence's College, Ampleforth, Yorks
A. G. Phillips-de-Lisle, Esq., Garendon Park, Loughborough
W. M. Ince-Anderton, Esq., Euxton Hall, Chorley
Charles Eccles, Esq., Stentwood, Honiton, Devon
O. W. Wicksted, Esq., Shakenhurst Hall, Worcester
C. B. E. Wright, Esq., Bolton Hall, near Clitheroe
G. Troyle Bullock, Esq., North Coker House, Yeovil
Chas. C. Capel, Esq., Foothill Fisheries, Kent
R. Andrews, Esq., Prestbury Hall, Cheshire
John Hampson, Esq., Ullenwood, near Cheltenham
Richard Smethurst, Esq., Ellerbeck Hall, Lancashire
T. M. Shuttleworth, Esq., Howick House, Preston
C. R. Collins, Esq., Strata Culme House, Hale, Devonshire
S. B. White, Esq., Manor House, Wetherfield, Essex
The Corporation of Blackburn
J. Barnes, Esq., Contractor, Chatburn and Hellifield Railway
The Executors of John Hargreaves, Esq., Burnley
G. Redmayne, Esq., Brathay Hall, Ambleside
Thomas Mason, Esq., Alkincotes Hall, Colne
Basil Sparrow, Esq., Gosfield Place, Halstead, Essex
R. O. Leycester, Esq., Toft Hall, near Knutsford
Fred. Lion, Esq., Seighford Hall, near Stafford
Logatt Ashford-Wise, Esq., Clayton Hall, Stoke-on-Trent
John Walker, Esq., Mount St. John, Thirsk
Henry Alison, Esq., Park Hall, Chorley
John Pennington, Esq., Emmott Hall, near Colne
G. Bayley-Worthington, Esq., Sharston Hall, Cheshire
David Russell, Esq., Silverburn, Leven
T. F. Ashe, Esq., Ankelow Hall, Cheshire
Hilton Greaves, Esq., Ankelow House, Audlem, Cheshire
The Lillieshall Iron Company, Salop
The Caestal Brick Company, Northop, Flint
The Leyland and Farington Gas Company
Benjamin Chaffer, Esq., Monkhill Quarries, Burnley
Charles Hill, Esq., Rockhurst, Sussex
Messrs. A. and W. Law, Manufacturers, Littleborough
Edward Singleton, Esq., Preston Deansery, Northampton
W. Hensman, Esq., Flint Hill, Winwick, near Rugby
T. J. Waller, Esq., Contractor, Chatburn & Hellifield Railway
Thos. Barber, Esq., Lingley, Eastwood, Notts
J. R. Shaw, Esq., Arrowe Park, Cheshire
Thos. Townley Townley-Parker, Esq., Cuerden, Lancashire
John Fielden, Esq., Grimston Park, Tadcaster
The Rev. Canon Bridges, The Avenue, Ewell, Epsom
Dr. G. W. Mould, Loxley Hall, Uttoxeter
A. Stead, Esq., Woodley, Romsey, Hants
John Rowe Bennison, Esq., Nursted House, Petersfield
J. Spender Clay, Esq., Ford Manor, Surrey

JOHN BLAKE, Engineer, ACCRINGTON, LANCASHIRE.

**MINING MACHINERY,
MILLING MACHINERY
Of the MOST APPROVED AMERICAN PATTERNS.
GOLD MILLS.**

The California pattern of Gold Stamp Mill is universally accepted as the most perfect, economic, and efficient made. We have over 900 stamps in successful work in the various Western Gold Districts.

SILVER MILLS.

Silver amalgamation in Pans is essentially an American system evolved after years of work on the rich silver mines of Nevada.

We have over 500 Stamps, with necessary pans, settlers, roasting furnaces, &c., all of our own manufacture, at work in different silver camps of the United States, Mexico, and South America, and Phillipine Islands, Asia.

CONCENTRATION MILLS

Of the most approved German pattern and arrangement, or with Stamps and Frue Vanner Concentrators for low grade silver ores, light in lead. We have over 20 large German pattern mills at work on lead, zinc, or copper ores, and numerous Vanner mills on ores never before successfully concentrated.

Mining Pumps, Cornish pattern, of the largest sizes. Hoisting Engines, from 4 h.p. up to the largest direct-acting engines to sink 3000 feet.

SMELTING WORKS.

We have 80 Water Jacket Smelting Furnaces in use from 20 in. circular up to 54 in. by 60 in. for lead and silver smelting; and special High Jacket Furnaces for copper ores.

Engines of any size, plain slide valve, Corliss, compound Corliss, Boilers, all sizes. Leaching Mills, Hallidie Wire Rope Tramways. Comet Crusher, with capacity of 12 to 20 tons per hour. White, Howell, Bruckner, and Stetefeldt Roasting Furnaces, &c.

We have had twenty years' experience in the manufacture solely of MINING MACHINERY, and have special facilities for shipping to all foreign parts through our New York Office, where all details of clearance, shipment, and insurance are conducted. Our machinery is already well known in Mexico, Peru, Chili, Venezuela, Honduras, and other South American countries.

Correspondence solicited. Descriptive Circulars and Catalogues on application.

FRASER AND CHALMERS.

PRINCIPAL OFFICE AND WORKS.

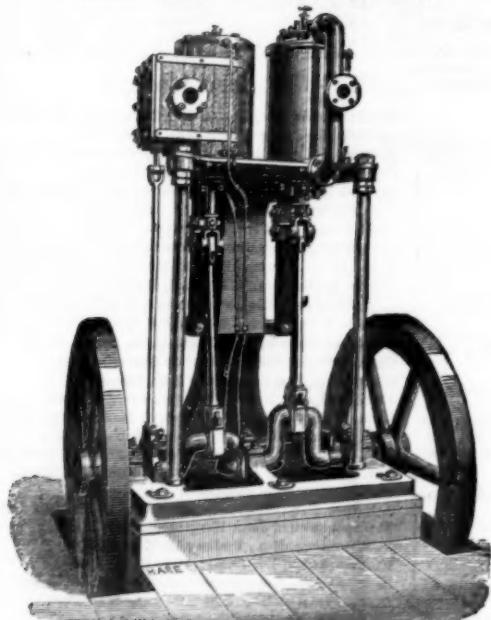
NEW YORK OFFICE.

Fulton and Union Streets,
Chicago, Ill., U.S.

No. 2, Wall Street,
New York, U.S.

COLORADO OFFICE—CHEESEMAN BLOCK, DENVER.

**THE
"Champion" Rock-borer
AND AIR COMPRESSOR.**



As an instance of the actual work done by this Machinery in various kinds of ground, some of it the hardest rock, it may be mentioned that in Cornwall, irrespective of the work performed by the "Champion" Rock-borers and Air-compressors purchased by various Mines, the drivage, rising, sinking, and stoning done by contract by the Proprietor with his own Machinery now amounts to over 1150 fathoms.

Several of these Air-compressors, ranging from 3½ to 12 tons in weight may be seen in constant work in the Camborne Mining District.

**R. H. HARRIS,
ENGINEER,**
63, QUEEN VICTORIA STREET, LONDON.

**KIRKSTALL, BOWLING, AND STAFFORDSHIRE BAR IRON
RAILS—RAILS—RAILS—**

New, slightly defective.

F.B. SECTION—BULL HEAD—DOUBLE HEAD—
10, 12, 14, 16, 18, 20, 24, 30, 40, 50, 60, 70, 75, 80 lb. per yard.

Sections on application to

WILLIAM FIRTH, WATER LANE, LEEDS.

POINTS and CROSSINGS with all Fittings complete.

2000 tons in stock ready for delivery.

**CLAYTON AND SHUTTLEWORTH,
STAMP END WORKS, LINCOLN, AND 78, LOMBARD STREET, LONDON.**

The Royal Agricultural Society of England have awarded Every First Prize to CLAYTON and SHUTTLEWORTH for Portable and other Steam Engines since 1863, and Prizes at every Meeting at which they have competed since 1849.



Steam Engines, portable & fixed

(For Coals, Wood, Straw, and every kind of Fuel)

Thrashing Machines.

Straw, Corn, and Hay Elevators.

Chaff Cutters for Steam Power.

Grinding Mills.

Saw Benches.

Traction Engines &c.

GOLD MEDALS AND OTHER PRIZES have been awarded to CLAYTON AND SHUTTLEWORTH at all the important International and Colonial Exhibitions, including LONDON, 1851 and 1862; PARIS, 1855, 1867, and 1878; VIENNA, 1857, 1866, and 1873

Catalogues in English and all European Languages free on application.

NOTE.—To insure deliveries in time for the next season, C. and S. beg their Foreign and Colonial Friends will not delay giving their orders.

THOMAS TURTON AND SONS,
MANUFACTURERS OF
MINING STEEL of every description.

**CAST STEEL FOR TOOLS. CHISEL. SHEAR. BLISTER. & SPRING STEEL
MINING TOOLS & FILES of superior quality.**
EDGE TOOLS, HAMMERS, PICKS, and all kinds of TOOLS for RAILWAYS, ENGINEERS, CONTRACTORS, and PLATELAYERS, LOCOMOTIVE ENGINE, RAILWAY CARRIAGE and WAGON SPRINGS and BUFFERS.

SHEAF WORKS & SPRING WORKS, SHEFFIELD.

LONDON OFFICES—30, CANNON STREET, E.C. PARIS DEPOT—12, RUE DES ARCHIVES. BOSTON, MASS., U.S.—40, KILBY STREET.

POTENTITE.

This unrivalled Explosive, as manufactured by the New and Perfected Machinery of the Company, is perfectly safe for transit, storage, and use, and is employed in every description of Mining or Quarrying Work, for Tunnelling, Pit Sinking, Engineering Work, and Submarine Operations, with the most complete success and satisfaction.

Potentite does not contain its own MEANS OF IGNITION, is free from Nitro-Glycerine, and its SAFETY has been special demonstrated by public experiments.

Its strength is unequalled.

In action it gives off neither flame, smoke, nor offensive smell. By its use labour is economised, as work can be resumed immediately after the shot is fired.

POTENTITE is specially adapted for export to hot climates, as it is unaffected by heat, and is free from dangerous exudations.

POTENTITE IS THE SAFEST STRONGEST, AND WORK FOR WORK, CHEAPEST EXPLOSIVE IN THE MARKET.

For particulars and prices, apply to—

THE POTENTITE COMPANY, LIMITED.

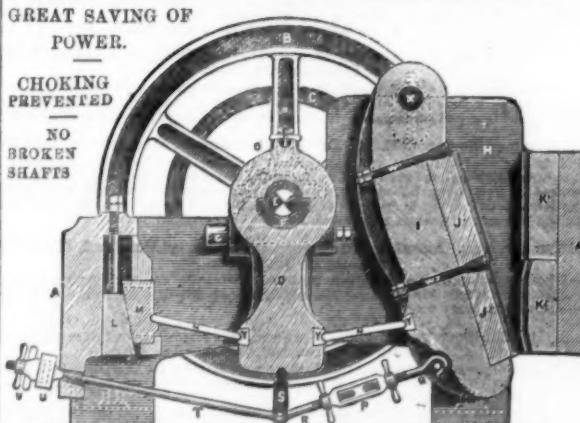
HEAD OFFICE—3, FENCHURCH AVENUE, LONDON, E.C.

ROBERT BROADBENT & SON, STALYBRIDGE,

PATENTEE AND SOLE MAKERS
OF THEIR WELL-KNOWN

**Patent Improved
BlakeStonebreakers
and Ore Crushers,**
With PATENT DRAW-BACK MOTION,
WHICH DISPENSES WITH ALL SPRINGS.
JAWS adaptable either for CUBING or CRUSHING.
Reversible in Four Sections, with Surfaced Backs.
Steel Toggle Cushions.

PRICES, PARTICULARS, AND TESTIMONIALS ON
APPLICATION.



MANCHESTER WIRE WORKS.

NEAR VICTORIA STATION, MANCHESTER.

(ESTABLISHED 1790).

JOHN STANIAR AND CO.,

Manufacturers by STEAM POWER of all kinds of Wire Web, EXTRA TREBLE STRONG for
LEAD AND COPPER MINES.

Jigger Bottoms and Cylinder Covers woven ANY WIDTH, in Iron, Steel, Brass, or Copper.
EXTRA STRONG PERFORATED ZINC AND COPPER RIDDLES AND SIEVES.



PERFORATED IRON, STEEL, COPPER, AND ZINC PLATES IN VARIOUS DIMENSIONS AND THICKNESSES.

Shipping Orders Executed with the Greatest Dispatch

DYNAMITE, GUN-COTTON, AND PATENT ELECTRIC FUSES,

FOR MINING, TUNNELLING, SUBMARINE, AND ALL KINDS OF BLASTING OPERATIONS.

THE EXPLOSIVES COMPANY (LIMITED)

30 and 31, ST. SWITHIN'S LANE, LONDON, E.C.



MELBOURNE EXHIBITION.

**GOLD AND SILVER MEDAL AWARDED for
Steam-Engines and Boilers, Winding Engines,
the Special Steam Pump, &c.**



TANGYES LIMITED,

CORNWALL WORKS, BIRMINGHAM.

LONDON:

ANGYE BROTHERS 35, QUEEN VICTORIA STREET, E.C.

NEWCASTLE:

TANGYE BROTHERS ST NICHOLAS BUILDINGS

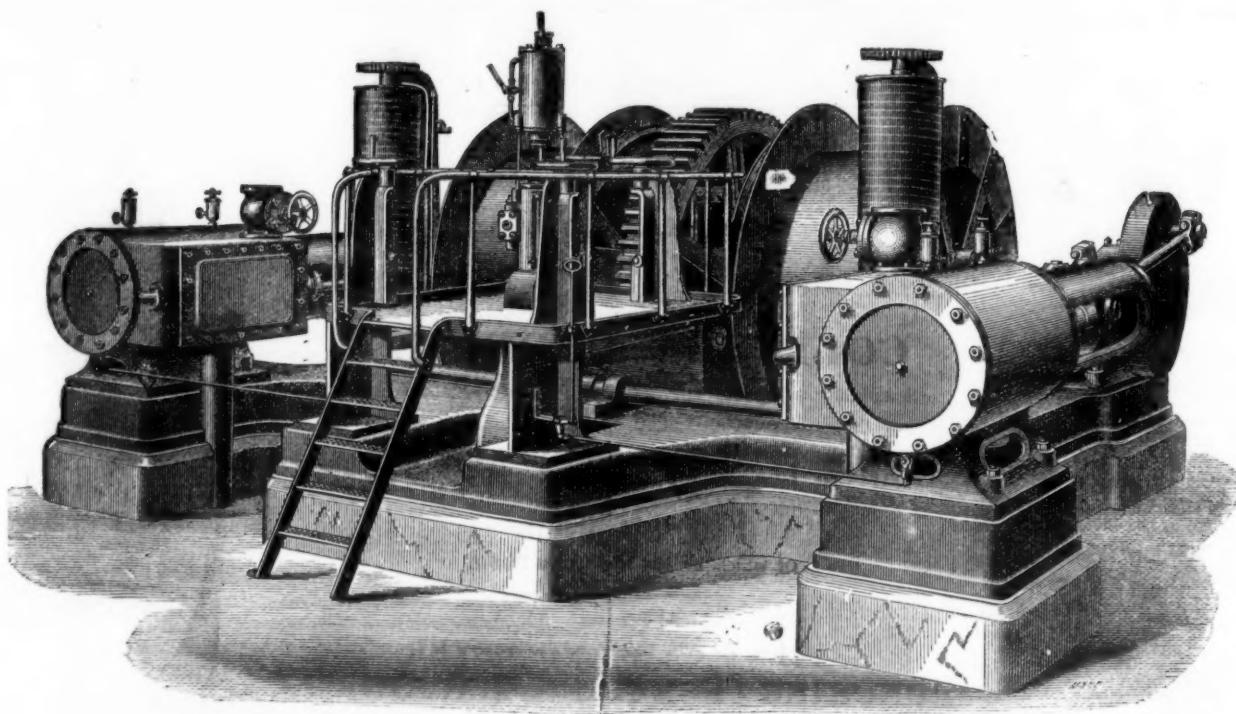
MANCHESTER:

ANGYE BROTHERS, DEANSGATE

GLASGOW:

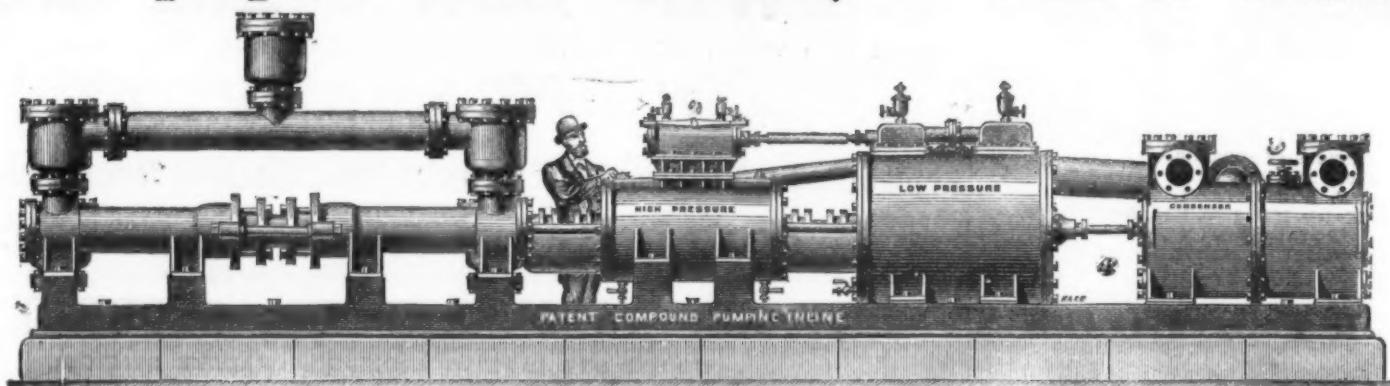
TANGYE BROTHERS ARGYLE STREET

TANGYE'S IMPROVED HAULING & WINDING ENGINE, WITH STEAM REVERSING GEAR.



TANGYE'S DIRECT-ACTING COMPOUND PUMPING ENGINE

For use in Mines, Water Works, Sewage Works,
And all purposes where Economy of Fuel is essential.



SUCCESSFULLY WORKING at the NEWCASTLE and GATESHEAD WATERWORKS, the ADELAIDE, CHESTERFIELD and BOYTHORPE, WYKEN, and other COLLIERIES.

THE BLAKE-MARSDEN NEW PATENT IMPROVED STONE BREAKERS AND ORE CRUSHERS.

ORIGINAL PATENTEE
AND ONLY MAKER.

H. R. MARSDEN, NEW PATENT FINE CRUSHER OR PULVERIZER,

ALSO PATENTEE AND ONLY
MAKER OF THE

FOR REDUCING TO AN IMPALPABLE POWDER, OR ANY DEGREE OF FINENESS REQUIRED,

GOLD QUARTZ, SILVER, COPPER, TIN, ZINC, LEAD

AND ORES OF EVERY DESCRIPTION;

PATENT REVERSIBLE CUBING AND CRUSHING
JAWS, IN FOUR SECTIONS,
WITH PATENT FACED BACKS, REQUIRING
NO WHITE METAL IN FIXING.

CRUCIBLE CAST-STEEL CONNECTING RODS.
RENEWABLE TOGGLE CUSHIONS, &c.

OVER 4000 IN USE.

EXTRACTS FROM TESTIMONIALS.

PULVERIZER.

"I have great pleasure in bearing testimony to the merits and capabilities of your patent combined fine crusher and sieving apparatus. I have tried it on a variety of ores and minerals, and it pulverizes them with equal success. You can put in a small paving stone and bring it out like flour."

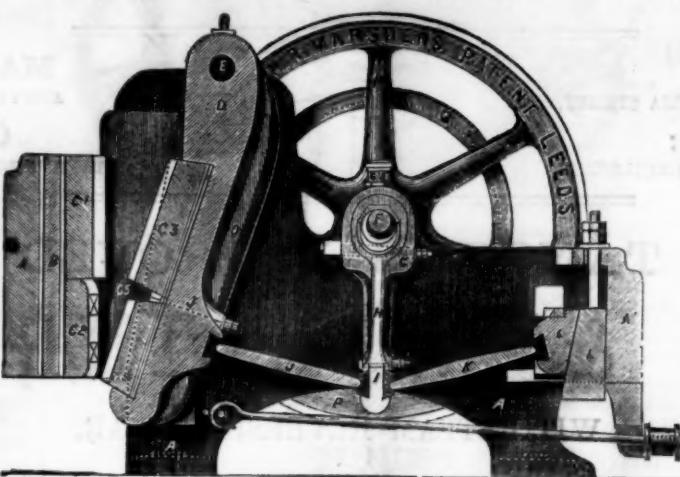
"In reply to your favour, I have much pleasure in informing you that the 12x3 Pulverizer we had from you is giving us every satisfaction. The material we are operating on is an exceptionally hard one. I am well satisfied with its working."

"Our experience is that the motion and mechanical arrangements of your machine are the best for pulverizing that we have ever met with."

"The reports from our mines as regards the working of your Fine Crusher (20x5) recently supplied are very favourable, although we cannot quote you exact figures. On being got into position it was tried by hand, with the result that it made short work of the biggest pieces of ore we put into the hopper. You might say how long you would take to deliver another of the same size."

"As I once before stated, your machine is a perfect pulverizer."

"I am sure this machine will be a success, and a great one, and there is any amount of demand for such a machine. We can work it with 20 lbs. of steam, and our engine, which is a 12-h.p., plays with the work, in fact we run the Stonebreaker and the Pulverizer both together with 35 lbs."



GREATLY REDUCED PRICES ON APPLICATION.

AWARDED OVER

60

FIRST-CLASS GOLD AND SILVER MEDALS.

ADOPTED BY THE PRINCIPAL CORPORATIONS, CONTRACTORS, MINING COMPANIES, &c., IN ALL PARTS OF THE WORLD.

ROAD METAL BROKEN EQUAL TO HAND, AT ONE-TENTH THE COST.

EXTRACTS FROM TESTIMONIALS.—STONEBREAKER.

"I now order Three of your Stone Crushers, size 15 x 10, to be of your very best construction, and to include two extra sets of Jaws and Cheeks for each. The last two 24x13 machines you sent me, which are at work in this colony, are doing very well. You will soon find that the railway contractors will adopt your machines in preference to the colonial ones—two of which I have. I know other contractors have had as many as nine of them, which have not given very good satisfaction. Once they know of yours thoroughly, I believe you will do a good trade with the colonies. For reference of the high character of your constructions you can refer to me as having used them with the very best results, both in New Zealand and this colony, and much prefer them to the colonial article, both in point of construction and less liability to go out of order. The material we are crushing is very hard blue stone, for railway ballast purposes. Push on with the order as quickly as possible; I do not think it necessary to have any engineering inspection. I have brought your machines prominently under the notice of all large contractors in this colony, likewise the Government. Many of the contractors have spoken to me in reference to their capabilities, and I could only tell them that they are by far and away the best and most economical I ever used. The very set of me having purchased now Eleven from you at various intervals and various sizes, and two above 12 years ago, and having tried all the other makers, is sufficient guarantee of the capabilities and the working of your machines. Yours in every way surpass all others."

"Some of your testimonials do not give your machines half their due. I have seen men hammering away on a big rock for a quarter of a day which your machine would reduce to the required size in a quarter of a minute. I would guarantee that your largest size machine would reduce more of the Cornish tin caps (which is the hardest rock of England) in a day than 200 men, and at 1-25th the cost."

FOR CATALOGUES, TESTIMONIALS, &c., APPLY TO THE SOLE MAKER,
H. R. MARSDEN, SOHO FOUNDRY, LEEDS.

JOHN CAMERON'S SPECIALTIES ARE HIS STEAM PUMPS FOR COLLIERY PURPOSES.

Specially adapted for forcing Water any height
ALSO, FOR

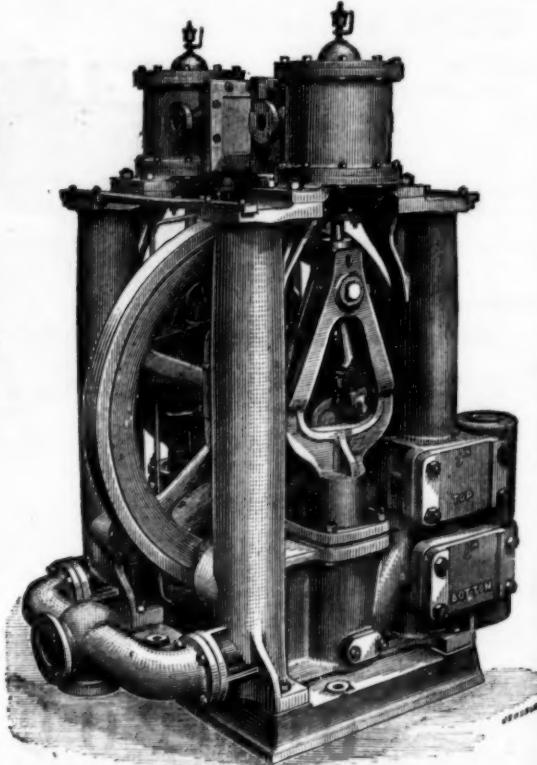
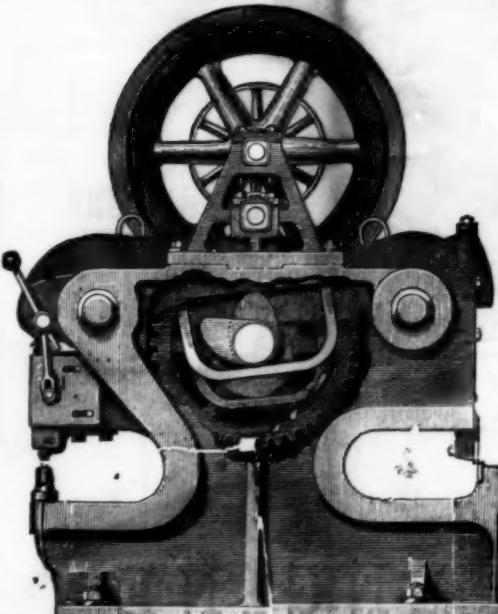
SINKING, FEEDING BOILERS AND STEAM
FIRE ENGINES,

Of which he has made over 9000.

ALSO, HIS
PATENT CAM AND LEVER
PUNCHING & SHEARING MACHINES.

Works: Oldfield Road, Salford.
Manchester.

AGENTS
For LONDON and DISTRICT—PRICE and BELSHAM,
52, QUEEN VICTORIA STREET, E.C.
For NEWCASTLE and EAST COAST—E. BECKWITH AND CO.,
BONNERSFIELD, SUNDERLAND.



By a special method of preparation this leather is made solid, perfectly close in texture, and impermeable to water; it has, therefore, all the qualifications essential for pump buckets, and is the most durable material of which they can be made. It may be had of all dealers in leather, and of—

HEPBURN AND GALE, LIMITED,
TANNERS AND CURRIERS,
LEATHER MILL BAND AND HOSE PIPE MANUFACTURERS,
LONG LANE, SOUTHWAKE, LONDON.
Prize Medals, 1851, 1855, 1878, for
MILL BANDS, HOSE, AND LEATHER FOR MACHINERY PURPOSES.

SPECIAL.
PULLEY BLOCKS
AND
BRASS FERRULES
(ALL KINDS.)
HOME AND EXPORT. CHEAPEST AND WARRANTED.
SEND FOR PRICES.

CRIMSHAW & CO.,
Mechanical Engineers, Brass Ferrule Makers, &c.,
ACCRINGTON, LANCASHIRE.

ESTABLISHED 1825.

EDWIN LEWIS AND SONS,

Patent Tube Works, MONMORE GREEN and Britannia Boiler Tube Works, ETTINGSHALL,
WOLVERHAMPTON.

MANUFACTURERS OF

Lapwelded & Butt-welded Wrought-iron, Steel, or Homogeneous Tubes
FOR EVERY

COLLIERY OR MINING PURPOSE.

J. WOOD ASTON AND CO., STOURBRIDGE
(WORKS AND OFFICES ADJOINING CRADLEY STATION),

Manufacturers of

CRANE, INCLINE, AND PIT CHAINS,
Also CHAIN CABLES, ANCHORS, and RIGGING CHAINS, IRON and STEEL SHOVELS, SPADES
FORKS, ANVILS, VICES, SCYTHES, HAY and CHAFF KNIVES, PICKS, HAMMERS, NAILS,
RAILWAY and MINING TOOLS, FRYING PANS, BOWLS, LADLES, &c., &c.

Crab Winches, Pulley and Snatch Blocks, Screw and Lifting Jacks, Ship Knees, Forgings, and Use Iron of all descriptions
WELDED STEEL CHAINS { FOR CRANES, INCLINES, MINES, &c.,
MADE ALL SIZES.